



Benha University
Faculty of Agriculture, Moshtohor

Prospectus of
FOOD SAFETY
Program

A Credit Hours Program
(Faculty Program)

English Distinguished Program

For BSc. Students

May 2013



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FOOD SAFETY – Definition

Food safety is a scientific discipline describing steps to produce safe food in farm, handling, preparation, and storage of food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer. In considering industry to market practices, food safety considerations include the origins of food including the practices relating to food labeling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. In considering market to consumer practices, the usual thought is that food ought to be safe in the market and the concern is safe delivery and preparation of the food for the consumer. In 2003, the World Health Organization (WHO) and FAO published the Codex Alimentarius which serves as a guideline to food safety. Labels used for "green" food, "organic" food and "pollution-free" food are not well recognized by traders and many are unclear about their meaning.

1. FOOD SAFETY PROGRAM PREFACE:

Food safety is a multidisciplinary field aimed at providing consumers with a high-quality food product, free of contaminants. It focuses on the analytical and toxicological aspects, in addition to risk analysis and management. Food safety has become increasingly important due to the globalization of the food supply chain and expanding international trade. The estimated cost to the world economy of food-related diseases and death is becoming very high. Thus, our main task is presenting such specific program in Food safety and technology which focuses in preparing professional specialists in Food safety and quality.

The prospectus of the food safety program is in accordance with, and guided by that of the Faculty of Agriculture, Moshtohor of 2009. This program is organized to be as a joint program among different Scientific Departments (i.e.



Faculty Program). It was modified to be up-to-date parallel with the new changes, and according to the following factors:

- 1) Adopting the credit-hour system.
- 2) Realizing continued improvisation as needed.
- 3) Revising the study courses in order to acquire quality recognition.
- 4) Providing the specialized work market with specialists of high and notable efficiency.
- 5) Improving the standard of the graduate to follow the high standards recommended by the Egyptian National Authority for Quality Assurance and Accreditation (NAQAEE).

1.1. Vision:

Elevating the standard of agriculture education in Food safety and technology and provide graduates capable of international competition in Food safety and technology who:

- 1) Understand scientific basis of agricultural production disciplines.
- 2) Provide knowledge, training and expertise in the production and regulation of safe food, free from harmful pathogens or toxicants;
- 3) Serve as leaders in identification and testing new foods and fodders with bioactive compounds and health benefits;
- 4) Can be multidisciplinary network experts in Food safety and quality research.
- 5) Benefit from the specialized facilities and expertise, including regulatory aspects, provided by Benha University to support the food industry.
- 6) Deal with technical aspects related to production of various agricultural products as well as animal resources.
- 7) Are self-aware of their efficiency and who acquire knowledge, refined practice and skills in Food safety and related technology.
- 8) Are up-to-date with contemporary issues in food production development.



1.2. Mission:

Obtain Agriculture Graduates who are capable of practicing Food safety and technology. Graduates of high standards, who can compete successfully in the local as well as the international Agriculture Investments/Business markets and specialized centers.

2. FOOD SAFETY PROGRAM AIMS:

This applied and profession-oriented program aims at providing continuing education opportunities for students finishing certificate of secondary education (Biology and mathematics) to become well-trained Agriculture Science BSc graduates in Food safety for the needs and benefits of the community. Students will gain intellectual abilities, knowledge and skills on a par with the international standards. This will be achieved through various means including carefully designed curricula, modern learning/teaching methodologies, multiple assessment tools, and workplace learning experience. The ultimate goal is to contribute to the well-being of the Egyptian society in general and its economy in particular.

3. THE GRADUATE OF FOOD SAFETY PROGRAM:

The graduate will be familiar with:

- 1) Having a scientific awareness of basics of food safety.
- 2) Handling with high efficiency the practical and scientific aspects of production of safe agricultural products such as fruits, vegetables and animal as raw or processed products, foodstuff and other edible crops and food products.
- 3) Practicing rational use of available resources.
- 4) Planning and executing agricultural studies and inventories in Food safety.
- 5) Acquiring high skills in communication through networks of information dissipation bodies.
- 6) Acquiring refined up-to-date knowledge and skills in Food safety and precautions and food production.



4. PROGRAM OUTCOMES:

4.1. Professional/academic knowledge and skills

On successful completion of the program, students should be able to:

- 1) Give an overview about the whole Agriculture Science with particular orientation in Food safety.
- 2) Demonstrate a clear understanding of the fundamentals of food chemistry and the analytical techniques associated with food.
- 3) Identify the major harmful microorganisms and other harmful substances in food as well as the conditions, including inspection and sanitation practices, under which the assurance of Food safety can be achieved.
- 4) Understand the basic principles involving food preservation, processing and engineering as well as the associated practices and requirements.
- 5) Acquire a thorough knowledge of government regulations for the manufacture and sale of food products.
- 6) Recognize current topics of significance to Food safety and hygiene.
- 7) Integrate and apply knowledge and skills to identify and solve Food safety and related problems, in particular those related to the control and assurance of the quality of food products, food hazards, and sanitation operation.
- 8) Be aware of the important relationship between food and health.
- 9) Possess supporting a knowledge as well as competence in practical skills to start a career in the food industry/business or enter into a postgraduate program in Food safety and Technology.

4.2. Attributes for all-roundedness:

By completion of the program, students should be able to:

- 1) Communicate effectively in both oral and written English
- 2) Appreciate the importance of life-long learning, information acquisition skills, leadership, organization skills, entrepreneurship and interpersonal skills for personal growth and development;
- 3) Commit to the highest standards of professional integrity and ethical values;



- 4) Demonstrate the abilities of critical thinking, creativity and analytical thinking as well as problem-solving skills that an undergraduate degree holder should have;
- 5) Recognize the needs for teamwork, social and national responsibility, cultural appreciation and global outlook.

5. THE LANGUAGE OF THE PROGRAM

The program is given in **English language** throughout all the levels of the study, stages and courses. This makes the graduate fully qualified for competing in the work market on the local as well as the international level. The graduate will be capable of handling aspects relating the electronic trade, with the implicated modern consequences. Having the study in English language, allows the students from other countries to attend in these programs particularly Africans, Asians, and other non-Arabic speaking countries.

6. DEPARTMENTS

6.1. Scientific Departments and Courses:

The courses and their contribution in the program by each department are given in Table 1.

6.2. Main departments contributing to the program:

The main departments which could contribute to the food safety program are given in Table 2.



Table 1: Departments and courses contributed in the programs.

No.	Department and its code	Courses contributed in Food safety program
1	Agronomy (AG 01)	4
2	Horticulture (HO 02)	5
3	Animal Production (AP 03)	5
4	Plant Protection (PP 04)	5
5	Soils (SO 05)	3
6	Agricultural Economics & Extension (EE 06)	3
7	Food Science (FS 07)	25
8	Agricultural Botany (AB 08)	5
9	Agricultural Biochemistry (AC 09)	6
10	Genetics & Genetic Engineering (GE 10)	4
11	Agricultural Engineering (AE 11)	5
12	Common and joint courses (CJ 12)	7
	Total	77



Table 2: Main departments contributing to the food safety program.

No.	Department
1	Food Science
2	Agricultural Biochemistry
3	Agricultural Botany
4	Agronomy
5	Animal Production
6	Horticulture
7	Plant Protection

6.3. Staff members:

The distribution of staff members and their assistants in different departments of the Faculty of Agriculture at Moshtohor are presented in Table 3.



Table 3: Distribution of staff members and their assistants in different scientific Departments*

No.	Department and Code	Teaching staff and their assistants					
		Professor	Professor Emeritus	Assistant Professor	Lecturer	Assistant Lecturer	Demonstrator
1	Agronomy (AG 01)	11	8	1	3	0	3
2	Horticulture (HO 02)	10	11	1	6	1	4
3	Animal Production (AP 03)	7	7	0	4	5	4
4	Plant Protection (PP 04)	5	4	5	5	5	2
5	Soils (SO 05)	4	3	3	6	3	1
6	Agricultural Economics&Extension (EE 06)	7	4	3	1	4	3
7	Food Science (FS 07)	7	6	3	2	3	3
8	Agricultural Botany (AB 08)	9	8	5	10	3	5
9	Agricultural Biochemistry (AC 09)	3	3	0	2	3	4
10	Genetics & Genetic Engineering (GE 10)	1	4	1	4	2	3
11	Agricultural Engineering (AE 11)	2	2	2	4	0	9
	Total	66	60	25	47	29	41

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6.4. The Faculty Facilities:

The lectures rooms, laboratories, symposia rooms, farms and Animal farms in the Faculty of Agriculture, Moshtohor are presented in Table 4.

Table 4: Lecture rooms, laboratories, symposia rooms, farms and Animal farms of the Faculty of Agriculture, Moshtohor

No.	Description*	Number*
1	Lectures rooms for more than 200 students.	6
2	Lectures rooms for less than 100 students.	25
3	Student Laboratories	20
4	Seminar and discussion rooms	15
5	Research Laboratories	16
6	Research and consultancy laboratories	18
7	Experimental and Research Center	1
8	Agricultural Analytical and Consultation Center	1
9	Animal and Poultry farms (about one 4 Feddan)	2
10	Crops and Horticultural farms (total area of 105 feddan).	

* See article 2 of the Moshtohor Faculty of Agriculture Prospectus (Credit hours).



7. ENROLLMENT AND THE STUDY SYSTEM

Article 1: Students and graduates eligible for enrollment in the programs (*in line with articles 4, 5 and 6 of the Faculty Prospectus*):

Students eligible for enrollment are those who obtain (a) certificate of Completing Secondary School Education (Science or Mathematics), or (b) a Certificate of Completion of Medium Technical Institutes (Biology).

Students obtaining Graduates eligible for enrollment are those who obtain BSc in Agriculture, Medicine, Veterinary Medicine, Science, Pharmacy, Medical Science, Education, and Home Economy.

Article 2: The body awarding the degree:

The BSc Degree in Food safety is awarded by the University of Benha, upon a request by the Faculty of Agriculture, Moshtohor.

Article 3: Study system, Student Evaluation and Degree Awarding

(*in line with articles 7 to 10 of the Faculty Prospectus*):

- a) The study Program for each of the Degrees of B.Sc. in Food safety is based on the credit-hour system.
- b) 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.
- c) 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 results of examinations for each level are fulfilled after the second semester.
- d) Each semester has two kinds of study courses: (i) Compulsory Courses (Obligatory) courses, all of which should be studied by students, and (ii) optional (selective) courses out of which the student chooses at least two to study, according to his/her preference and aptitude.
- e) Each student should study at least 6 courses in each semester: 4 Compulsory Courses and 2 optional, in addition to any other course(s) essential for all students as decided by the University or the Faculty Board.



- f) The student must register for 12 credit-hours minimum and 21 maximum per semester. (The Faculty Board may weaver this requisite as they see fit).
- g) Minimum number of students registered in an optional course is three. (The Faculty Board may weaver this requisite as they see fit).

Article 4: Summer Session:

The Board of the Faculty Council 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 each 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 a summer session are no more than three. A student can enroll for a Summer session if (a) successful passing of such courses allows him/her to be transferred to the next level; or (b) in cases of fulfilling requirements of a full program, or (d) fulfilling the summer training.

Article 5: Award of BSc Degree:

For a student to be awarded a BSc degree in Food safety he/she fulfill successfully the study throughout the entire duration of the full program (all in English language) of **no less than 148 credit hours** (52 Compulsory Courses in levels 1 and 2, 48 Compulsory Courses in levels 3 and 4; 48 selective. Table 5 shows the distribution of the credit hours.

Table 5: Number of credit hours for the BSc Degree in Food safety

Level	Semester	Number of credit hours		Grand total of credit hours
		Compulsory Courses (Obligatory)	Optional Courses (selective)	
1	2	26	12	38
2	2	26	12	38
3	2	24	12	36
4	2	24	12	36
Total	8	100	48	148



Article 6: Categorization of students and their status:

Level 1: Fresh students (enrolled for first time). Also students in this level who failed to pass 32 credit hours of the Program.

Level 2: Students elevated from level 1 passing successfully 32 credit hours at least. Also students who did not pass beyond 69 credit hours of the Program.

Level 3: Students who passed successfully 70 credit hours. Also students who failed to pass successfully beyond 105 credit hours of the Program.

Level 4: Students who passed, successfully, 106 credit hours of the program.

Article 7: The 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) 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 issues concerning the studies of the student. The opinion of the student's Academic Guide is advisory and not necessarily Compulsory Courses 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.

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 optionals, or (b) add an extra course within the accepted limit of studied courses. This should be done within the first two weeks of the course commencement in the 1st or 2nd semester; or within the first week in the summer course.



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

Article 10: Proceeding to higher levels within the program:

The student can proceed from one level to another (higher above it) if succeeded in all courses. Students failing a course have a right to re-register and sit their examination as others.

Article 11: Failure in a Course:

In a case of failing the final examination in any Compulsory Courses (obligatory) course, the student should (*in line with article 19 of the Faculty Prospectus,*) reregister 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.

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 student 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 exam of a course with no acceptable alibi or permissible excuse (and 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.



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 per course) must be done, organized by the concerned scientific Department. At end of each semester, 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.

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

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 five. 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 Law for Universities` organization).

Article 16: Calculating Grade-Point Average (GPA) 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 Grade Point Average (GPA) ranging from 0.0 to 4.0. Table 6 shows each grade in terms of GPA 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.

Table 6: Grades and their percentages of maximum marks, values of Grade Point Average (GPA) and Codes

Grade	Percentage of maximum marks (%)	GPA value	Grade code
Excellent	95and more	4.0	A
	90to less than95	3.7	A ⁻
	85to less than90	3.4	B ⁺
Very Good	80to less than85	3.0	B
	75to less than80	2.8	B ⁻
Good	70to less than75	2.4	C ⁺
	65to less than70	2.0	C
Pass	60to less than65	1.6	C ⁻
	55to less than60	1.3	D ⁺
	50to less than55	1.0	D
Weak	30to less than50	0.0	F
Very Weak	less than30	0.0	F ⁻

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’ (GPA) is as follows: concerning any particular level (academic year) calculated:



- a) **For one study level (an academic year):** Summation of the { (GPA points for the course X credit hours of the course)..., regarding all courses attempted by student)} divided by (the total sum of **credit hours** of courses of *the academic year*).
- b) **For the entire 4-year program:** Summation of the (GPA points for the course X credit hours of the course, regarding all courses attempted by student); divided by (the total sum of credit hours of courses of the *four academic years*).

Article 18: The Honor Grade:

A student gets an *Honor* 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).

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 during the first two years of his joining the program failed to fulfill a minimum of 29 credit hours.

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 .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 such case the Faculty would participate partially to facilitate procedures of travels and permits. 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.

Article 21: 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**.

Article 22: The curriculum and the Required Credit Hours:

Students are required to complete at least **148** credits for all courses. The credits hours of these programs are **52** compulsory in levels one and two, **48** compulsory in levels three and four, and **48** selective in each level of three and four. The courses and their codes in scientific department contributing to the programs are listed in Table 7.

Table 7: The courses and their codes in Scientific Department contributing to the program

Serial	Department	Code
1.	Agronomy	AG 01
2.	Horticulture	HO 02
3.	Animal Production	AP 03
4.	Plant Protection	PP 04
5.	Soils and Water science	SO 05
6.	Agricultural Economics & Extension	EE 06
7.	Food Science	FS 07
8.	Agricultural Botany	AB 08
9.	Agricultural Biochemistry	AC 09
10.	Genetics and Genetic Engineering	GE 10
11.	Agricultural Engineering	AE 11
12.	Common and joint	CJ 12



8. DETAILS OF FOOD SAFETY PROGRAM COURSES:

The courses lists of the Food safety Program are given in Appendix 1. Detailed contents of joint courses as well as courses given by different departments for the Food safety program are as follows:

8.1. Common and Joint Courses (CJ)

Course Name: English 1(Code: CJ 1201)

Pre-requisite:

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:

- 1) Introduction.
- 2) Simplified English.
- 3) Difficulties for English language users.
- 4) Grammar and vocabulary.
- 5) Informative statements.
- 6) Passive and Active.
- 7) Countable and uncountable nouns.
- 8) Comparative (qualified and unqualified) statements.
- 9) Definitions: general and formula definition
- 10) Spoken English and written English.
- 11) American English and UK English.
- 12) Determinate indeterminate expressions.

References:

- 1) **Swan, M.1983.** Practical English usage.6thimpression, Oxford University Press, UK. http://www.amazon.com/Practical-English-Usage-Michael-Swan/dp/0194420965/ref=sr_1_1/185-8701008-9717268?s=books&ie=UTF8&qid=1390943837&sr=1-1&keywords=0194420965



- 2) **Bauer, L. 2007.** The linguistics student`s handbook. Edinburgh University Press, UK. http://www.amazon.com/Linguistics-Students-Handbook-Laurie-Bauer/dp/0195332849/ref=sr_1_1?s=books&ie=UTF8&qid=1390943919&sr=1-1&keywords=The+linguistics+student%60s+handbook

Course Name: English 2 (Code:CJ 1202).

Prerequisite: (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:

- 1) Introduction.
- 2) Scientific English.
- 3) Dimensions and properties.
- 4) Scientific statements and verb tense.
- 5) Description of experiments.
- 6) Explanatory descriptions.
- 7) Subject-forms in description (imperative, passive, 1st or 2nd person).
- 8) Concise statements.
- 9) Proper statements on tables, figures, maps and graphs.
- 10) Standard International (SI) measuring units.

References:

- 1) **Swales, J.M. 1990.** Genre analysis: English in academic and research settings.13th Printing, Cambridge University Press, UK. http://www.amazon.com/Genre-Analysis-Academic-Cambridge-Linguistics/dp/0521338131/ref=sr_1_1?s=books&ie=UTF8&qid=1390944163&sr=1-1&keywords=Genre+analysis
- 2) **Bauer, L. 2007.** The linguistics student`s handbook. Edinburgh University Press, UK. http://www.amazon.com/Linguistics-Students-Handbook-Laurie-Bauer/dp/0195332849/ref=sr_1_1?s=books&ie=UTF8&qid=1390943919&sr=1-1&keywords=The+linguistics+student%60s+handbook



Course Name: Computer Science (Code: CJ 1203)

Pre-requisite: (CJ 1201)

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:

- 1) Introduction to computer science.
- 2) Learning about different uses of computer.
- 3) Familiarizing with Windows[®] software (e.g. Windows95; Windows7).
- 4) Microsoft Word software.
- 5) Microsoft systems.
- 6) Reasons and problem-solving.
- 7) Software applications.
- 8) Maximizing performance.

References:

- 1) **Bhattachajee, A.K., Mukherjee, S. and Brookshear, J.G. 2012.** Computer Science. Pearson Education Ltd. London, UK.
http://www.amazon.com/Computer-Science-Overview-Glenn-Brookshear/dp/0132569035/ref=sr_1_1?s=books&ie=UTF8&qid=1390946765&sr=1-1&keywords=Computer+Science
- 2) **Lalanda, P., McCann, J.A., and Diaconescu, A. 2013.** Autonomic Computing: Principles, design and implementation. Springer-Verlag London, UK.
http://books.google.com.eg/books?id=1RQ_AAAAQBAJ&printsec=frontcover&dq=Autonomic+Computing:+Principles,+design+and+implementation&hl=en&sa=X&ei=ESroUturNa-HyAPHsoFI&redir_esc=y#v=onepage&q=Autonomic%20Computing%3A%20Principles%2C%20design%20and%20implementation&f=false



Course Name: Biosafety (Code: CJ 1205)

Prerequisite: (AB 0801)

Course Description:

The course deals with handling techniques and methods regarding bio-agents. It provides the student with skills of dealing safely with bio-agents and laboratory equipment, and extends the concept of protecting individuals, community and environment from the negative effects of objects. It provides practical information on topics such as fire safety and first aid procedures

Course Contents:

- 1) Introduction and general principles.
- 2) Guidelines, risk assessment, biosafety levels.
- 3) Laboratory biosecurity concepts.
- 4) Laboratory equipment: safety cabinets, safety equipment.
- 5) Efficient and safe laboratory techniques, contingency emergency plans disinfection and sterilization, handling infectious substances.
- 6) Fire safety and first aid: fire triangle, fire types, fire extinguishers, fire emergency procedures.
- 7) First aid: kits, treatments.
- 8) Scientific research ethics: use of animal scientific research, experiments causing pain to scientific human or animal subjects, alternatives for animals in research.

References:

- 1) **WHO. 2004.** Laboratory biosafety manual. 4th Ed. World Health Organization (WHO) of the United Nations, Geneva. http://books.google.com.eg/books?id=qVHfjFINjzwC&printsec=frontcover&dq=Laboratory+biosafety+manual&hl=en&sa=X&ei=PCroUuHRM4a_ywPYk4CICQ&ved=0CDgQ6AEwAA#v=onepage&q=Laboratory%20biosafety%20manual&f=false
- 2) **Richmond J.Y. and McKinney R.W. 2000.** Primary containment for biohazards: selection, installation and use of biological safety cabinets, 2nd Ed., U S Department of Health and Human Services, Washington, DC,USA. <http://books.google.com.eg/books?id=-NeCHAAACAAJ&dq=Primary+containment+for+biohazards&hl=en&sa=X&ei=WCroUtTTM8OeyQPD9YG4BA&ved=0CDgQ6AEwAA>



Course Name: Human Rights and Agricultural Legislation (Code:CJ 1206)

Prerequisite: (CJ 1201)

Course Description:

The Human Rights covers, in particular, the primary documents related to human rights law in Africa of the United Nations, the Organization of African Unity, and the domestic legal systems of all 53 African countries. The course could also focus on the baby, men, women and adults right. On the other hand, the Agricultural Legislation related to the environments could be included.

Course Contents:

- 1) The Human Rights related to rights law in Africa of the United Nations
- 2) The Organization of African Unity and the domestic legal systems of all 53 African countries.
- 3) The babies, men, women and adults rights.
- 4) The Agricultural Legislation related to the environments could be included.
- 5) The regulation related to agricultural production and environment.
- 6) The effect of Agricultural production on the environment.

References:

- 1) **Christof Heyns 2002.** Human Rights Law in Africa 1999 (Human Rights Law in Africa) (v. 4) Springer; 1 edition (June 12, 2002). <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) **Jorg Fedtke 2003.** Human Rights and the Private Sphere: A Comparative Study. Routledge publisher . 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



Course Name: The Graduation Project (Code: CJ 1208)

Pre-requisite:

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:

- 1) The subject, scheme, discipline of the project is planned according to the rules of the university.
- 2) A dissertation should be prepared and a seminar be given, after which a panel of examiners gives the final decision on it.

References:

- 1) **North Carolina 2010.** High School Graduation Project Requirement Should Remain a Local School District Decision: Final Report to the Joint Legislative Program Evaluation Oversight Committee. Program Evaluation Division, North Carolina General Assembly, 2010. <http://books.google.com.eg/books?id=IFwHcgAACAAJ&dq=High+School+Graduation+Project+Requirement+Should+Remain+a+Local+School+District+Decision&hl=en&sa=X&ei=zCroUoPTGcq9ygPvpoLoDQ&ved=0CC8Q6AEwAQ>
- 2) **Nancy Jean Carolan 2009.** Student Perceptions of the Senior Project Graduation Requirement. Educational Research and Policy Analysis, <http://www.lib.ncsu.edu/resolver/1840.16/4202>

Course Name: Effective Communication Skills (Code: CJ 1207)

Pre-requisite: CJ 1202

Course Description:

This course could help readers learn to improve their ability to speak, write, and share ideas. Lots of specific life and work examples of each type of communication, plus quizzes and practice exercises to sharpen communication skills.



Course Contents:

- 1) Collaborative organizational structures, combined with the pressure to translate innovative ideas into action quickly.
- 2) A wealth of strategies and tactics for building skills, to the benefit of individuals, teams, and companies.
- 3) To identify specific real-world challenges that technical professionals face in the workplace, and offers definitive guidelines for enhancing their communication skills-from making presentations to giving and receiving criticism to navigating office politics.
- 4) Featuring interviews with people in the trenches, as well as self-assessment tools and exercises, Effective Communication Skills will become a valued resource for technical professionals and their colleagues, trainers, and HR departments in all industries.

References:

- 1) **MTD Training 2009.** Effective Communication Skills. MDT training Ventus publishing APS Book boon. <http://books.google.com.eg/books?id=L70C49-qgckC&printsec=frontcover&dq=Effective+Communication+Skills&hl=en&sa=X&ei=6iroUqjSJ8noygOS1ICoCQ&ved=0CDAQ6AEwAQ>
- 2) **Marsha Ludden 2002.** Effective Communication Skills: Essential Skills for Success in Work and Life. JIST Publishing, 2002. <http://books.google.com.eg/books?id=LKxBh70xi0YC&printsec=frontcover&dq=Effective+Communication+Skills&hl=en&sa=X&ei=6iroUqjSJ8noygOS1ICoCQ&ved=0CCoQ6AEwAA#v=onepage&q=Effective%20Communication%20Skills&f=false>
- 3) **Harry E. Chambers 2000.** Effective Communication Skills for Scientific and Technical Professionals. Basic Books (December 26, 2000). <http://books.google.com.eg/books?id=QsyOBNDxzi4C&printsec=frontcover&dq=Effective+Communication+Skills&hl=en&sa=X&ei=6iroUqjSJ8noygOS1ICoCQ&ved=0CDUQ6AEwAg#v=onepage&q=Effective%20Communication%20Skills&f=false>



8.2. Courses of Agronomy Department (AG 01)

Course Name: Agronomy 1 (Fundamentals) (Code: AG 0101)

Pre-requisite:

Course Description:

The aim of the course is to ensure that students develop knowledge, understanding and skills related to crop origin, classification, environmental factors, seed bed preparation, sowing methods, fertilization, irrigation, harvesting process, weed control and principles of crop breeding.

Course Contents:

- 1) Origins and classification of crops.
- 2) Geographic crop distribution (Egypt and world).
- 3) Environments and crop growth.
- 4) Seed-bed preparation and seeding methods.
- 5) Crop husbandry operations: replanting, thinning, fertilization, irrigation and weed control.
- 6) Crop rotation
- 7) Crop breeding methods.

References:

- 1) **Pratley, J. E. 2003.** Principles of field crop production. Oxford University Press, 2003 USA.
<http://books.google.com.eg/books?id=zS0hAQAAMAAJ&q=Principles+of+field+crop+production&dq=Principles+of+field+crop+production&hl=en&sa=X&ei=UyvoUpfPLei6ygPxvIHoBQ&ved=0CDAQ6AEwAQ>
- 2) **Wayne Smith C. 1995.** Crop Production: Evolution, History, and Technology. Wiley; 1st Edition (December 12, 1995)
http://books.google.com.eg/books?id=6phFr8cb_PUC&printsec=frontcover&dq=Crop+Production:+Evolution&hl=en&sa=X&ei=4SvoUseXNcGJyQOr2IDoCw&ved=0CCoQ6AEwAA#v=onepage&q=Crop%20Production%3A%20Evolution&f=false



Course Name: Agronomy 2 (Seeds and Weeds) (Code: AG 0102)

Pre-requisite: (AB 0501)

Course Description:

Studies on the formation of seeds, seed sampling, purity, germination, dormancy, viability, seed index, vigor test, and seed laws. Importance, classification, dispersals, losses, ecological factors affecting weed growth, methods of weed control (physical biological & chemical) to determine the most efficient in weed control

Course Contents:

- 1) Seed multiplication.
- 2) Seed testing, seed technology, seed viability.
- 3) Seed index and seed laws.
- 4) Weed biology, weed classification and distribution.
- 5) Weed control strategies.

References:

- 1) **David C. Gwynne 1985.** Weed Biology and Control: In Agriculture and Horticulture Batsford Academic and Educational, David C. Gwynne, Robert Burns Murray, pp 258.
http://books.google.com.eg/books?id=1_HwAAAAMAAJ&q=Weed+Bi+logy+and+Control&dq=Weed+Bi+ology+and+Control&hl=en&sa=X&ei=_ivoUtf8BpLCygPnyoHAAw&ved=0CC8Q6AEwAQ
- 2) **McDonaled M.B. 2000.** Seed priming. *In* Black, M. and Bewley J.D. Eds 'Seed technology and its biological basis' Plenum press, New York. USA.
http://books.google.com.eg/books?id=6Ce8esRmfmoC&pg=PA485&dq=Se+ed+priming&hl=en&sa=X&ei=HSzoUqu4PMf_ygPg_IJw&ved=0CFYQ6AEwCA#v=onepage&q=Seed%20priming&f=false
- 3) **Vanangamudi, K.; Bhaskaran, M; Balavidhya, S. and Murali Arthanari, P. 2013.** Weed Seed Biology. Hardback, 473 Pages
<http://www.scientificpub.com/productdetail.php?bid=468>



Course Name: Agronomy 3 (Crop Production) (Code: AG 0103)

Pre-requisite: (AG 0101)

Course Description:

The aim of the course is to understand the importance of field crops and their role in fulfilling the basic needs for human consumption and animal feeding, studying the environmental requirements for economic crops in Egypt, studying the cultural practices for economic crop groups pre-and post-harvest including sowing methods, fertilization, irrigation, weed control, harvesting processes.

Course Contents:

- 1) The economic Importance of different field crops.
- 2) Relationship between environment factors (biotic and abiotic) and agricultural practices in crop production.
- 3) Botanical description of field crops.
- 4) Appropriate cultural practices of different field crops, including: wheat, rice, maize, faba bean, clover, cotton. flax, soybean, peanut, sugar cane and sugar beet.
- 5) Harvesting processes in different field crops.

References:

- 1) **Kassem. A.A., Omar, M.A and Nowar, A.I. 2007.** Production of field crops. (*In Arabic*). El-Fateh print. & Purplish. Co., Alexandria. Egypt.
- 2) **Smith, D. L. and Hamed, C. 1999.** Crop yield, physiology and processes. Springer-Verlag, Berlin Heidelberg, Germany.
<http://www.amazon.com/Crop-Yield-Physiology-Donald-Smith/dp/3642636446>

Course Name: Bio-statistics and Experimental Design (Code: AG 0104)

Prerequisite: (AE 1102).

Course Description:

The aim of the course is to know the designing and execution of experiments dealing with agricultural aspects. Statistical analysis of data acquired from the experiments to draw scientific valid and dependable conclusions .Statistical analyses relating data obtained from inventories and surveys to reach



needed relationships between and among different parameters of scientific and field concerns.

Course Contents:

- 1) Introduction about the significance of statistical analysis in agricultural experiments.
- 2) Basic rules of experimental designs
- 3) Simple experiment in different designs (completely randomized, complete randomized block and Latin designs)
- 4) Factorial experiments
- 5) Test of homogeneity and Combined analysis
- 6) Covariance analysis
- 7) Response curve
- 8) Correlation and regression analysis.

References:

- 1) **Snedecor, G.W. and Cochran, W.G. 1989.** Statistical methods, 8th Ed. Iowa State, Univ. Press Ames Iowa, USA.
<http://www.amazon.com/Statistical-Methods-George-W-Snedecor/dp/0813815614>
- 2) **Gomez, K.A. and Gomez A.A. (1984).** Statistical procedures for agricultural research, 2ndEd. John Wiley & Sons, NY, USA.
<http://www.amazon.com/Statistical-Procedures-Agricultural-Research-Edition/dp/0471870927>

8.3. Courses of Horticulture Department (HO 02)

Course Name: Horticulture 1 (Fundamentals) (Code: HO 0201)

Prerequisite: (AB 0801)

Course Description:

The course involves description of structure, growth, development maintenance, and use of horticultural plants, propagation, environment, greenhouse and nursery activities .Old and new trends.



Course Contents:

- 1) An overview of the horticulture Industry and the economic importance.
- 2) Subdivisions. Morphology, anatomy and biology of horticultural plants.
- 3) Processes of growth and development.
- 4) Plant growth phases and growth structures of greenhouses, and hotbeds.
- 5) Light, water, and nutrients in relation to horticulture plant growth.
- 6) Sexual and asexual propagation.
- 7) Micro-propagation.
- 8) Nurseries and bedding plants.
- 9) Survey of the important Horticultural Industries.
- 10) Fruit Industry, Vegetable Industry, Ornamental, Medicinal and Aromatic Plants Industry, Landscape Industry.
- 11) Biotechnology & new trend in the industry.

References:

- 1) **Adams, C., Bamford, K. and Early, M.K. 2011.** Principles of Horticulture. 6th. Ed. Routledge, Taylor & Francis Group Ltd, Oxford, UK. http://www.amazon.com/Principles-Horticulture-Charles-Adams/dp/0080969577/ref=sr_1_1?s=books&ie=UTF8&qid=1390947572&sr=1-1&keywords=Principles+of+Horticulture
- 2) **Janick, J 1986.** Horticultural science.4th. Ed. W.H. Freeman & Co., San Fransisco, CA, USA. http://www.amazon.com/Horticultural-Science-Jules-Janick/dp/0716717425/ref=sr_1_2?s=books&ie=UTF8&qid=1390947601&sr=1-2&keywords=Horticultural+science

Course Name: Horticulture 2 (Vegetable Production) (Code: HO 0202)

Prerequisite: (HO 0201)

Course Description:

The course involves the distribution of vegetable crops and their types. Growing vegetables in field and under protected enclosures. Important varieties. Seeds and seed growing. Cultivation and husbandry. Pest control .Harvesting, packing and storage. Seeds production.



Course Contents:

- 1) Monocotyledonea: Families of:
- 2) Araceae (Arum family) Taro or Dasheen; Alliaceae (Allium family) Onion, Garlic; liliaceae (Lily family) Asparagus.
- 3) Dicotyledoneae: Families of:
- 4) Solanaceae (Night-shade family); Tomato, Potato, Pepper, Eggplant; Fabaceae (Legume family) Pea, Common bean, Cowpea, Broad bean; Brassicaceae (Mustard family) Cabbage, Cauliflower, Kohlrabi, Brussels Sprouts, Radish, Turnip; Compositae (Compsite family) Lettuce, Artichoke, Girosale; Umbelliferae (Parsley family) Carrote, Celery, Parsley; Chenopodiaceae (Goosefoot family) Spinach, Garden beet, Chard; Rosaceae (Rosa family) Strawberry; Convolvulaceae (Morning-glory family) Sweet potato; Cucurbitaceae (Gourd family) Watermelon, Sweet melon, Cucumber, Squash; Malvaceae (Mallow family) Okra; Tiliaceae (Jew's Mallow) Egyptian Jew's Mallow

References:

- 1) **Fordam, R. and Briggs, A.G. 1985.** Principles of vegetable production. Collins Co. London, UK. http://www.amazon.com/Principles-Vegetable-Crop-Production-Fordam/dp/0003830144/ref=sr_1_5?s=books&ie=UTF8&qid=1390947638&sr=1-5&keywords=Principles+of+vegetable+production
- 2) **Thompson, A.K. 2003.** Fruit and vegetable harvesting, handling and storage. Blackwell Publ., Oxford, UK. http://www.amazon.com/Fruit-Vegetables-Harvesting-Handling-Storage/dp/1405106190/ref=sr_1_1?s=books&ie=UTF8&qid=1390947696&sr=1-1&keywords=Fruit+and+vegetable+harvesting%2C+handling+and+storage

Course Name: Horticulture 3 (Fruit Production) (Code: HO 0203)

Prerequisite: (HO 0201)

Course Description:

The course deals with the commercial importance of evergreen and deciduous fruit trees and their structure, ecology, growth and development.



Orchard initiation, management, and operations are mentioned. Flowering, fruit-setting and development are given along with disease and pest management, and harvesting.

Course Content

- 1) Growth, production of fruits including
- 2) Evergreens: Citrus, Date palm, Mangoes, Banana, Olive,
- 3) Guava, Annona, Papaya, and Avocado.
- 4) Grapes, Stone fruits, Pome fruits, Catkin-bearing Nut trees,
- 5) Figs and pomegranates.
- 6) History and Importance of horticulture fruits, and areas of production.
- 7) Propagation and nursery operations.
- 8) Climate, soil and water requirements.
- 9) Orchard planting, cultural operations and maintenance practices
- 10) Tree efficient performance, flowering, fruit-setting and development.
- 11) Disease and pest management.
- 12) Fruit maturity and harvesting.

References:

- 1) **Singh, A. 2003.** Fruit physiology and production. Kalyani Publ., New Delhi, India, pp 574.
<http://www.amazon.com/Fruit-Physiology-Production-Amar-Singh/dp/8127211788>
- 2) **Childers, N.F. 1995.** Modern Fruit Science: Orchard and Small Fruit Culture. 10th Edition, Hort. Publ., Gainesville, FL, USA, pp 583.
http://www.amazon.com/Modern-Fruit-Science-Orchard-Culture/dp/0938378104/ref=sr_1_1?s=books&ie=UTF8&qid=1390947737&sr=1-1&keywords=Modern+Fruit+Science%3A+Orchard+and+Small+Fruit+Culture



Course Name: Horticulture 4 (Ornamental, Medicinal & Aromatic plants)(Code: HO 0204)

Prerequisite: (HO 0201)

Course Description:

The course provides knowledge on identification of such plants, nomenclature, floriculture cultivation, multiplication and production. Herbaceous plants, flowering bulbs, roses and shrubs, trends in cut flower, industry and biotechnology, medicinal and aromatic, environmental consideration, biodiversity and conservation.

Course Contents:

- 1) Introduction of floriculture.
- 2) Economic importance of floriculture.
- 3) Cut-flower production and floriculture industry.
- 4) Flower plants of: Chrysanthemum, Carnation, Roses, Iris, Gladiolus, Dahlia, Narcissus, Liliium, Tulip and others.
- 5) Flowering shrubs, Cacti and succulent shrubs.
- 6) Aquatic and semi-aquatic plants.
- 7) Lawns and ground covers.
- 8) Introduction and History of medicinal and aromatic plants.
- 9) Agro techniques of medicinal, aromatic and oil plant culture.
- 10) Drug plants culture and quality control.
- 11) Biodiversity conservation.

References:

- 1) **Brill, S. and Dean, E. 1994.** Identifying and harvesting edible and medicinal plants in wild (and so wild) places). Harper Collins Publ. Inc., NY, USA.
[http://www.amazon.com/Identifying-Harvesting-Edible-Medicinal-Plants/dp/0688114253/ref=sr_1_1?s=books&ie=UTF8&qid=1390947774&sr=1-1-1&keywords=Identifying+and+harvesting+edible+and+medicinal+plants+in+wild](http://www.amazon.com/Identifying-Harvesting-Edible-Medicinal-Plants/dp/0688114253/ref=sr_1_1?s=books&ie=UTF8&qid=1390947774&sr=1-1&keywords=Identifying+and+harvesting+edible+and+medicinal+plants+in+wild)



- 2) **Gladstar, R. 2012.** Rosemary Gladstar`s medicinal herbs: A. beginner`s guide: 33 healing herbs to know, grow and guide. Storey Publ., MA., USA. http://www.amazon.com/Rosemary-Gladstars-Medicinal-Herbs-Beginners/dp/1612120059/ref=sr_1_1?s=books&ie=UTF8&qid=1390947808&sr=1-1&keywords=Rosemary+Gladstar%60s+medicinal+herbs
- 3) **Mase, M. 2013.** The wild medicine solution: Healing with aromatic, bitter and tonic plants. Healing Arts Press, Rochester, VT, USA. http://www.amazon.com/Wild-Medicine-Solution-Healing-Aromatic/dp/1620550849/ref=sr_1_1?s=books&ie=UTF8&qid=1390947862&sr=1-1&keywords=The+wild+medicine+solution%3A+Healing+with+aromatic%2C+bitter+and+tonic+plants

Course Name: Horticulture 6 (Post-harvest Technology) (Code:HO 0206)

Prerequisite: (HO 0201)

Course Description:

The course involves morphology, structure, composition and nutritional value of fresh fruits and vegetables. Physiology and biochemistry, maturity and ripening and storage environments are given. Temperature, humidity, and physiological and pathological disorders, packing management, growth regulators are mentioned. Importance of precooking and transportation.

Course Contents:

- 1) Morphology and structure of fresh fruits and vegetables.
- 2) Composition and nutritional value of vegetables and fruits.
- 3) Physiology and biochemistry of horticulture products.
- 4) Physiological response to temperature and humidity.
- 5) Maturity, ripening in relation to horticulture products quality.
- 6) Harvesting, transportation and packing management.
- 7) De-greening and control of ripening.
- 8) Plant growth regulators.
- 9) Technologies of storage.
- 10) Physiologic pathologic diseases.



References:

- 1) **Kader, A.A., Kasmire, R.F., Mitchelle, F.G., Reid, M.S., Sommer, N.F. and Thompson, J.F. 2002.** Post-harvest technology of horticultural crops. Dev. Agric. Publ, University of California, CA,, USA. http://www.amazon.com/Postharvest-Technology-Horticultural-Crops-3rd/dp/1879906511/ref=sr_1_2?s=books&ie=UTF8&qid=1390947901&sr=1-2&keywords=Post-harvest+technology+of+horticultural+crops
- 2) **Thompson, A.K. 2003.** Fruit and vegetable harvesting, handling and storage. Blackwell Publ. oxford, UK. http://www.amazon.com/Fruit-Vegetables-Harvesting-Handling-Storage/dp/1405106190/ref=sr_1_1?s=books&ie=UTF8&qid=1390947970&sr=1-1&keywords=Fruit+and+vegetable+harvesting%2C+handling+and+storage

8.4. Courses of Animal Production Department (AP 03):

Course Name: Animal Production 1 (Physiology) (Code: AP 0301)

Prerequisite: (PP 0401).

Course Description:

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

Course Contents:

- 1) Animal cell.
- 2) Homeostasis.
- 3) Heat regulation.
- 4) The circulation system.
- 5) The respiratory system.
- 6) The nervous system.
- 7) The digestive system.
- 8) The excretory and urine system-
- 9) The endocrine glands.
- 10) The reproduction system.

References:



- 1) **John E. Hall 2010.** Guyton and Hall Textbook of Medical Physiology. 12th Edition, W.B. Saunders Co., London, pp 1120 pages.
<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. Edition, Lea and Febiger, Philadelphia, USA, pp 509 pages
<http://www.amazon.com/Reproduction-Farm-Animals-E-Hafez/dp/0683305778/>

Course Name: Animal Production 2 (Dairy & Meat) (Code: AP 0302)

Prerequisite (AP 0301):

Course Description:

The course involves identification of the importance of meat and milk and the obstacles involved. It teaches students the skills to establish farm animal flocks for dairy and meat production. Functions of different reproductive stages in farm animals are mentioned and methods of natural and artificial insemination are included.

Course Contents:

- 1) Introduction to animal production in Egypt.
- 2) Reproduction in dairy cattle.
- 3) Reproductive stages in cows and hormones of regulation.
- 4) Milk lactation in cows; udder structure; factors affecting milk yield and components.
- 5) Causes of low reproductively and sterility in dairy cattle herds.
- 6) Establishing milk farms.
- 7) Importance of meat for humans; world meat production and consumption.
- 8) Beef cattle production systems; commercial classification of meat productions; meat productions in Egypt.
- 9) Beef carcass grades and cuts; dressing and boneless meat percentage.
- 10) Sheep growth, production and classification and growth parameters. Mutton (sheep meat); sheep feeding system and sheep carcass.
- 11) Sheep wool.
- 12) Breed methods selection.

References:



- 1) **Robert E. Taylor, and Tom G. Field 2011.** Scientific Farm Animal Production: An Introduction to Animal Science, Tenth Edition [Abridged] [Paperback], Prentice Hallpp672 pages,
<http://www.amazon.com/Scientific-Farm-Animal-Production-10th/dp/0135111498/>
- 2) **Patricia Botes, and Albert Mazibuko 2007.**Animal Production: Level 2 (Fet College Series) Pearson Education South Africa (July 1, 2007),
<http://www.amazon.com/Animal-Production-Level-Fet-College/dp/1868917290/>

Course Name: Animal Production 3 (Poultry) (Code: AP 0303)

Prerequisite: (AP 0301)

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 factors affecting meat and egg production are included along with the productive performance of poultry birds.

Course Contents:

- 1) The poultry industry.
- 2) Biology of domestic fowl.
- 3) Reproduction of birds.
- 4) Incubation and hatcher management.
- 5) Brooding and rearing.
- 6) Poultry houses and equipment.
- 7) Meat production
- 8) Egg production and Egg quality.

References:

- 1) **Colin G. Scanes, George Brant, M.E. and Ensminger Deceased 2003.** Poultry Science. 4th Edition, [Paperback], Prentice Hall, pp 512 pages.
<http://www.amazon.com/Poultry-Science-4th-Colin-Scanes/dp/0131133756/>
- 2) **Nuhad J Dagher, 2008.** Poultry Production in Hot Climates [Hardcover]. CABI; Second edition (May 2008), pp464 pages,
<http://www.amazon.com/Poultry-Production-Climates-Nuhad-Dagher/dp/1845932587/>



Course Name: Animal Production 4 (Fish) (Code: AP 0304)

Prerequisite: (GE 1001)

Course Description:

The course gives descriptions on the operations associated with fish production means of the aquaculture technology as well as fisheries.

Course Contents:

- 1) Development of fish resources in Egypt.
- 2) Marine fish resources.
- 3) Inland lake fisheries.
- 4) Aquaculture constraints in Egypt.
- 5) Relationship between water quality and fish activities.
- 6) Fish migration and reproduction.
- 7) Methods of fish culture, and kinds of fish farms.
- 8) Cages and pens, fish culture in rice fields.
- 9) Integrated fish culture and duck farms.
- 10) Fish marketing
- 11) Fish disease.

References:

- 1) **Lawson, T. 2013.** Fundamentals of Aquacultural Engineering, Springer, NY, USA.
<http://www.amazon.com/Fundamentals-Aquacultural-Engineering-Thomas-Lawson/dp/0412065118>
- 2) **BrownEvan E. 2013.** World Fish Farming: Cultivation and Economics. Avi Publishing Co Inc.; 2nd Edition, pp540 pages
<http://www.amazon.com/World-Fish-Farming-Cultivation-Economics/dp/0870554271>



Course Name: Animal and Poultry Hygiene (Code: AP 0308)

Pre-requisite: AP 0301

Course Description:

The aim of this course is to define the main sources of diseases in animal and poultry farms and methods of its prevention and control in addition the role of other environmental factors such as temperature, humidity,on animal health.

Course Contents:

- 1) Epidemiology (Introduction, Diseases occurrence, Etiological factors, Primary et. F., Secondary et. F., Epidemiological triangle, Methods of diseases spreading, Factors affecting diseases spreading Quarantine, Prevention and control of contagious diseases).
- 2) Air hygiene (Sources of an pollution, Prevention and control of air pollution, Physical factors, Air temperature, Air humidity, Lighting system, Radiation)
- 3) Water hygiene (Sources of water pollution, Methods of water improvement)
- 4) Housing systems (Methods of housing large animal, Methods of housing poultry)
- 5) Control of skin parasites
- 6) Biosecurity (Principles of biosecurity in poultry farms, Biosecurity in large poultry farm animal).

References:

1. **David Sainsbury 1998.** Animal Health, Wiley-Blackwell, 2nd Edition, pp 272 pages,
<http://www.amazon.com/Animal-Health-David-Sainsbury/dp/0632038888/>
2. **Drago C. Herenda, Don A. Franco 1999.** Poultry Diseases and Meat Hygiene: A Color Atlas. Wiley-Blackwell; 1 edition (May 11, 1999)],
<http://www.amazon.com/Poultry-Diseases-Meat-Hygiene-Color/dp/081382463X/>



3. **Kovács, P. Rafai 2002.** Progress in Animal Hygiene. International Society for Animal Hygiene, Akademiai Kiado,
<http://www.amazon.com/Progress-Animal-Hygiene-Rafai-Kovacs/dp/9630509423/>
4. **David E. Swayne, J.R. Glisson, L.R. McDougald and L.K. Nolan 2013.** Diseases of Poultry. Wiley-Blackwell; 13th Edition, Hardcover: pp1408 pages,
<http://www.amazon.com/Diseases-Poultry-David-E-Swayne/dp/0470958995/>

8.5. Courses of Plant Protection Department (PP 04):

Course Name: Zoology (Code: PP 0401).

Prerequisite: (CJ 1201)

Course Description:

The course surveys major taxa of the animal kingdom and animal anatomy, physiology, ecology and evolution. It gives a basic the principles of animal cell and taxonomy with emphasis on characteristics of major animal phyla. Important animal parasites affecting living organisms, and structure and function of principal animal body systems are included.

Course Contents:

- 1) Introduction.
- 2) Nature and manifestation of life, the cell and its division.
- 3) Embryonic development.
- 4) Symmetry in animals and Animal taxonomy.
- 5) Protozoa general morphology.
- 6) Parasites (Trypanosoma, Entamoeba, Plasmodiophora, Sporangospora and plasmodium).
- 7) Parazoa and metozoa; Types oand division.
- 8) Phyla: Platyhelminthes; Nematoda; Annelida; Arthropoda; Mollusca; Chordata.



References:

- 1) **Dorit, R. L., Walker, W. F. and Barnes, R. D. 1991.** Zoology. Saunders College Publ. NY, USA. http://www.amazon.com/Zoology-Stephen-Miller/dp/0073524174/ref=sr_1_1?s=books&ie=UTF8&qid=1390948033&sr=1-1&keywords=Zoology
- 2) **Bhamrah, H.S. and Juneja, K. 2002.** An Introduction to Mammals. Anmol Publications PVT. Ltd New Delhi, India.
http://www.amazon.com/Introduction-Marine-Mammal-Biology-Conservation/dp/0763783447/ref=sr_1_1?s=books&ie=UTF8&qid=1390948090&sr=1-1&keywords=An+Introduction+to+Mammals
- 3) **Gamil, N.S. 2001.** Invertebrate zoology. Part II: The Coelomates. The Plam Press, Washington, DC. http://www.amazon.com/Invertebrate-Zoology-Functional-Evolutionary-Approach/dp/0030259827/ref=sr_1_1?s=books&ie=UTF8&qid=1390948153&sr=1-1&keywords=Invertebrate+zoology

Course Name: Entomology (General) (Code: PP 0402)

Prerequisite: (PP 0401)

Course Description:

The course aims to provide knowledge to students about insects, their importance and effects in human life, their body and appendages, anatomy, external and internal morphology, ecology, classification and taxonomy.

Course Contents:

- 1) Introduction.
- 2) Taxonomical position.
- 3) Distribution of insects.
- 4) Harms and benefits of insects.
- 5) Main parts of insect body and appendages.
- 6) External morphology (Head: mouth-parts, antennae and ocelli;
- 7) Thorax: segments, legs and wings; Abdomen: segments, cerci and male and female genitalia).



- 8) Internal anatomy and systems (digestive, respiratory, circulatory, reproductive and nervous systems).
- 9) Ecology (life-cycle, distribution, immature stages).
- 10) Classification: Common insects of economic value; Insects harmful to agriculture and stored products and methods of their control, beneficial insects (honey bee, silkworm, predacious and parasitic insects).

References:

- 1) **Borror, D.J., Triplehorn C.A. and Johnson N.F. 1989.** An introduction to the study of insects. 6th Ed, Philadelphia, Saunders College Publ. USA.
http://www.amazon.com/Introduction-Insect-Pest-Management-3rd/dp/0471589578/ref=sr_1_10?s=books&ie=UTF8&qid=1390948207&sr=1-10&keywords=An+introduction+to+the+study+of+insects
- 2) **Harwood R.F. and James M.T. 1979.** Entomology in human and animal health. McMilian Publ., Co., NY, USA.
http://www.amazon.com/Entomology-Human-Animal-Health-William/dp/0023516003/ref=sr_1_1?s=books&ie=UTF8&qid=1390948264&sr=1-1&keywords=Entomology+in+human+and+animal+health

Course Name: New Approaches in Pest Control (Code: PP 0409)

Pre-requisite: PP 0401

Course Description:

The course provides student with knowledge about the integration of a range of practices for economic pest control or suppress pest population below the economic injury level. Also focuses on minimizing the risk of pesticides to human health and environment.

Course Contents:

- 1) Concepts of integrated pest management (IPM).
- 2) The problems of the repeated use of pesticides.
- 3) The advantages of IPM programs.
- 4) Inspection and survey of Insect pests.
- 5) Identification of insect pests.
- 6) Acceptable pest levels.



- 7) Preventive cultural practices.
- 8) Monitoring of the target pests.
- 9) Mechanical control methods.
- 10) Behavioral control.
- 11) Application of legislations.
- 12) Biological control.
- 13) Animal pest control
- 14) Predacious and parasitic mites
- 15) Pheromones in animal pest management
- 16) Animal pest resistant to pheromones
- 17) Commercialization – problems and benefits of pheromones
- 18) Levels of injury and economic threshold of infestation.
- 19) The final option (the use of pesticides).
- 20) The integration between all methods and plant protection

References:

- 1) **Callander, S.B 1984.** Integrated pest management rodent control in poultry operation. Side Series and Workbook, Visicol Chemical Co-op., Chicago, IL. USA. http://www.amazon.com/Integrated-Pest-Management-Ecological-Perspective/dp/0123985293/ref=sr_1_1?s=books&ie=UTF8&qid=1390948361&sr=1-1&keywords=Integrated+pest+management+rodent
- 2) **Carter, W. 1973.** Insects in relation to plant diseases. John Wiley & Sons Inc; 2nd edition, USA. http://www.amazon.com/Insects-relation-disease-Walter-Carter/dp/B007T2VC04/ref=sr_1_1?s=books&ie=UTF8&qid=1390948405&sr=1-1&keywords=Insects+in+relation+to+plant+diseases
- 3) **Johnson, W. T. and Lyon, H. H. 1991.** Insects that feed on trees and shrubs. 2nd Ed., Cornell Univ. Press, Ithaca, NY, USA. http://www.amazon.com/Insects-that-Trees-Shrubs-Comstock/dp/0801426022/ref=sr_1_1?s=books&ie=UTF8&qid=1390948441&sr=1-1&keywords=Insects+that+feed+on+trees+and+shrubs



Course Name: Pesticide Residues (Code: PP 0408)

Pre-requisite: (PP 0401 or AC 0901)

Course Description:

This course aims to supply the students with different information and skills about Pesticide Residues in Food and Environment, Pesticide Persistence and Determination and Pesticide Health Effects.

Course Contents:

- 1) Definitions and Terminology
- 2) Pesticide Classes and Persistence
- 3) Pesticide Residues and Behavior (in Food and Environment)
- 4) Analysis of Pesticide Residues (Sampling, Sample preparation, Extraction, Clean Up, GC and HPLC Determination)
- 5) Pesticide Hazards and Health Effects
- 6) Future Considerations for Environmental and Human Health

References:

- 1) **World Health Organization 2007.** Pesticide Residues in Food 2007: Toxicological Evaluations (WHO Pesticide Residues in Food). World Health Organization; 1st Edition (May 2010).
http://www.amazon.com/Pesticide-Residues-Food-2007-Toxicological/dp/9241665238/ref=sr_1_2?s=books&ie=UTF8&qid=1390948475&sr=1-2&keywords=Pesticide+Residues+in+Food+2007
- 2) **Denis Hamilton, Stephen Crossly 2004.** Pesticide Residues in Food and Drinking Water: Human Exposure and Risks. Willy Blackwell.
http://www.amazon.com/Pesticide-Residues-Food-Drinking-Water/dp/0471489913/ref=sr_1_1?s=books&ie=UTF8&qid=1390948516&sr=1-1&keywords=Pesticide+Residues+in+Food+and+Drinking+Water%3A+Human+Exposure+and+Risks



Course Name: Economic entomology (Code: PP 0403)

Pre-requisite: (PP 0402)

Course Description:

This course is designed to introduce students to the concepts of agricultural entomology and pest management emphasizing theory and practice of pest population management; economic threshold; current research; population modeling; sampling techniques; data analysis; ecological bases for control; control by host resistance and by biological, genetic, physical, behavioral, cultural, and chemical means; integrated systems of pest management.

Course Contents:

- 1) Identify the most important arthropod pests injuring fruits, vegetables, and field crop in Jordan through general appearance and symptoms.
- 2) Describe the life history and host range of each pest.
- 3) Understand the interactions between pest and host plant.
- 4) Set up specific monitoring programs for sampling and forecasting the arthropod pests.
- 5) Describe the past, current and promising new practices for pest management for each situation.
- 6) Integrate management measures across pest discipline for a given crop, asses their legal aspects and potential side effects.

Reference:

- 1) **William J. Baerg 2009.** Introduction to Economic Entomology. From Press Russellville printing Company.
http://www.amazon.com/Introduction-economic-entomology-William-Baerg/dp/B0008A5Q2E/ref=sr_1_11?s=books&ie=UTF8&qid=1390948557&sr=1-11&keywords=Introduction+to+Economic+Entomology
- 2) **Indian Museum, E.C. Cotes 2009.** Notes on Economic Entomology. Superintendent of Government printing, India.
http://www.amazon.com/Notes-Economic-Entomology-Issues-1-2/dp/1271874695/ref=sr_1_1?s=books&ie=UTF8&qid=1390948615&sr=1-1&keywords=Notes+on+Economic+Entomology



8.6. Courses of Soil Department (SO 05):

Course Name: Soil and Water Science (Code: SO 0501).

Prerequisite: (AC 0901)

Course Description:

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

Course Contents:

- 1) Concepts of soil.
- 2) Soil formation and classification.
- 3) The 3 phases of soil: liquid, gaseous and solid.
- 4) Soil mineralogy and chemistry.
- 5) Soil organic matter and differentiation from soil microbial biomass.
- 6) Soil microbiology and microbial biomass.
- 7) Soil physics and physical parameters.
- 8) Soil-water relationships.
- 9) Soil functions and land use
- 10) Degradation of soil
- 11) Water use in Egypt and the world
- 12) Water quality and factors affecting water use
- 13) Water and the environment
- 14) Options for the future(Balancing water demand with water resources)
- 15) Water loss control.
- 16) Water productivity in agriculture.
- 17) Water pollution.
- 18) Water scarcity.
- 19) Water scarcity.



References:

- 1) **Brady, N.C., and Weil, R.R. 2001.** The nature and properties of soil. Prentice-Hall, London.UK. http://www.amazon.com/Nature-Properties-Soils-14th/dp/013227938X/ref=sr_1_1?s=books&ie=UTF8&qid=1390948647&sr=1-1&keywords=The+nature+and+properties+of+soil
- 2) **Ayres, R.S. and Westcot, D.W. 1985.** Water quality for agriculture. Food and Agriculture Organization (FAO) of the United Nations, Rome, Italy. http://www.amazon.com/Water-Quality-Agriculture-Irrigation-drainage/dp/925100093X/ref=sr_1_3?s=books&ie=UTF8&qid=1390948684&sr=1-3&keywords=Water+quality+for+agriculture.+Food+and+Agriculture+Organization
- 3) **Matma T. 1999.** Quality assessment of water and waste water. 3rd Ed. Lewis Publ. Inc., NY, USA. http://www.amazon.com/Quality-Assessment-Water-Wastewater-Mamta/dp/1566703824/ref=sr_1_1?s=books&ie=UTF8&qid=1390948729&sr=1-1&keywords=Quality+assessment+of+water+and+waste+water

Course Name: Biophysics (Code: SO 0502).

Prerequisite (SO 0501 or AC 0901)

Course Description:

Developing knowledge and understanding on how physics laws and theories work in the biological sphere and community starting from the cell up to the organisms and the live community. Molecular, cellular, kinetic, enzymatic and related topics are involved. All of which help in comprehending and appreciating the variety in the living world as well as managing and conserving our biological resources.

Course Contents:

- 1) Scope and development of Biophysics.
- 2) pH and buffering concepts.
- 3) Chemical bonds, ionic, covalent and others; hydrous and peptide bonds.



- 4) Colloidal state.
- 5) Separation and identification of materials.
- 6) Concept of chromatography (partition chromatography, paper Chromatography, adsorption Chromatography).
- 7) Ion exchange.
- 8) Electrophoresis. Centrifugation and sedimentation.
- 9) Crystal structure and X-Ray Crystallography and diffraction.
- 10) Theory of absorption of light by molecules; Beer-Lambert law.

References:

- 1) **Glaser, R. 2012.** Biophysics: An introduction. 2nd Ed., Springer-Verlag, Berlin Heidelberg, Germany, http://www.amazon.com/Biophysics-Introduction-Roland-Glaser/dp/3642252117/ref=sr_1_2?s=books&ie=UTF8&qid=1390948781&sr=1-2&keywords=Biophysics%3A+An+introduction
- 2) **Gopalan, R. 2009.** Inorganic Chemistry for Undergraduates. Universities Press India http://www.amazon.com/Inorganic-Chemistry-Undergraduates-R-Gopalan/dp/8173716609/ref=sr_1_1?s=books&ie=UTF8&qid=1390948820&sr=1-1&keywords=Inorganic+Chemistry+for+Undergraduates

Course Name: Bio-Organo Fertilization (Code: SO 0504).

Prerequisite (AB 0803 or SO 0501)

Course Description:

The course intends to get the student aware of the importance and needs for making and utilizing organic materials in crop production. Different methods of preparing composts for plant nutrition. Mechanisms and organisms involved in the fermentation and composting are to be covered. Materials used for composting and their suitability are to be assessed. Reviewing the different techniques and methods of preparing composts needed for plant nutrition. Mechanisms and organisms involved in the fermentation and composting are to be covered. Materials used for composting and their suitability are to be assessed. Bio-fertilization and bio-fertilizers.



Course Contents:

- 1) Organic materials as providers of available plant nutrients.
- 2) Organic manures (e.g. farmyard manure, compost and sewage)
- 3) Micro-organisms and biological agents used for enhancing soil fertility.
- 4) Compost production, chemical and biological processes, and quality.
- 5) Commercial compost production systems.
- 6) Compost effect on crop growth and yield.
- 7) Compost economics: production and utilization in agriculture.
- 8) Potential hazards, precautions, and regulations of compost production and utilization.
- 9) Nitrogen sources, mineralization rates, and nitrogen nutrition benefits to plants from composts.
- 10) Plant nutrition of P, K, Ca, Mg and micronutrients from compost.
- 11) Bacteria, fungi, and other organisms used for bio-fertilization.
- 12) Bio-fertilizers, their classification, production, use and modes of action.
- 13) Mechanisms and techniques of bio-fertilization.

References:

- 1) **EIRI 2007.** Handbook of biofertilizers and vermiculture. Engineers India Research Institute (EIRI), Delhi, India. http://www.amazon.com/Handbook-Biofertilizers-Biopesticides-Khobragade-Deshmukh/dp/8189473158/ref=sr_1_7?s=books&ie=UTF8&qid=1390948872&sr=1-7&keywords=Handbook+of+biofertilizers
- 2) **Fossel, P.V. 2007.** Organic farming: Everything you need to know. Voyageur Press, St. Paul, MN, USA. http://www.amazon.com/Organic-Farming-Everything-Need-Know/dp/0760324697/ref=sr_1_1?s=books&ie=UTF8&qid=1390948922&sr=1-1&keywords=Organic+farming

8.7. Courses of Economics and extension Department (EE 06):



Course Name: Agricultural Economics (Fundamentals) (Code: EE 0602)

Pre-requisite: AE 1102

Course Description:

The course acquaints the student with the science of economics. It is the science that analyzes production, distribution and consumption of goods and services. It also gives the student a background on our economic system, our resources and goals of our system, the law of supply and demand and other related information.

Course Contents:

- 1) Introduction and goals of studying economics.
- 2) Macro-economic and related issues: national income, measuring performance of economy, unemployment, element of the theory of income and employment.
- 3) Fiscal policy and public debt.
- 4) Money, Banking, Monetary policy and the fiscal-monetary mix. Central banking. Interest and macroeconomic equilibrium.
- 5) Economic growth and ecology.
- 6) Supply and demand and laws of production and cost.
- 7) Economics of firms. How price and output are determined. Perfect competition. Monopoly and imperfect competition.
- 8) Domestic economic problems. Business and government. Labour unions and industrial relations.
- 9) International economics. The world`s economies. International trade. International finance. Commercial and financial policies.

References:

- 1) **John B. Penson Jr., Oral T. Capps Jr., C. Parr Rosson III, Richard T. and Woodward, 2009.** Introduction to Agricultural Economics (5th Edition), Prentice Hall http://www.amazon.com/Introduction-Agricultural-Economics-John-Penson/dp/0131592483/ref=sr_1_1?s=books&ie=UTF8&qid=1390948957&sr=1-1&keywords=Introduction+to+Agricultural+Economics



2) Evan Drummond, H. and John W. Goodwin 2010. Agricultural Economics (3rdEdition) Prentice Hall.

http://www.amazon.com/Agricultural-Economics-Evan-Drummond-Ph-D/dp/0136071929/ref=sr_1_1?s=books&ie=UTF8&qid=1390948986&sr=1-1&keywords=Agricultural+Economics

Course Name: Technology Transfer and Diffusion (Code: EE 0605)

Prerequisite: (EE 0602).

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 process and examples of successful cases are included.

Course Contents:

- 1) Introduction. Concepts and characteristics of agricultural biotechnology and its transfer.
- 2) Technology adaptation and dissemination (diffusion).
- 3) Stages and areas of technology transfer and conditions for its success.
- 4) Role of agricultural extension (advisory) service in technology transfer and harmonization.
- 5) Nature of the relationships among the various systems which produce, transfer and use agriculture biotechnology.
- 6) Dissemination, diffusion and spreading of agricultural biotechnology.
- 7) Stages of technology transfer.
- 8) The technology transfer approach and the other alternatives: A comparative critic assessment.
- 9) Types of Agriculture extension system concerning technology transfer.
- 10) Cases of successful achievements in technology transfer as shown by research in agriculture extension.
- 11) Examples: for private entrances to study agricultural extension and technology transfer process (the entrance to the training and visit-the entrance of Cultural Relations).



- 12) Important proposals for enhancing and updating agriculture extension for biotechnology transfer in Egypt.

References:

- 1) **El-Halwagi, M.M. 1996.** Biogas technology transfer and diffusion. Springer, Netherlands. http://www.amazon.com/Technology-Transfer-Diffusion-Mahmoud-El-Halwagi/dp/1851660003/ref=sr_1_1?s=books&ie=UTF8&qid=1390949014&sr=1-1&keywords=Biogas+technology+transfer+and+diffusion
- 2) **Wolfe, J.L. and Orr, J.F. 2012 .**Technology transfer and the diffusion of innovations. Vance Bibliographies, Orland, CA, USA. http://www.amazon.com/Technology-Transfer-Economy-International-Entrepreneurship/dp/1461461014/ref=sr_1_11?s=books&ie=UTF8&qid=1390949063&sr=1-11&keywords=Technology+transfer+and+the+diffusion

Course Name: Agricultural Marketing (Code: EE 0623)

Pre-requisite: EE 0602

Course Description:

The course aims to introduce students to: The importance of marketing and entrances-the properties of agricultural products-jobs and services-marketing-price fluctuations-Tract marketing.

Course Content

- 1) The framework of the marketing problem and analyzing agricultural and food markets.
- 2) Food consumption and marketing.
- 3) Food wholesaling and retailing.
- 4) Prices and marketing costs.
- 5) Types of agricultural biotechnology products.
- 6) Market concentration and marketing channels of products.
- 7) Exports of products. Grading, packaging and requirements demanded by foreign importers.
- 8) Trade regulations and rules to be enforced.
- 9) New markets to encourage investments.



- 10) Food safety enforcement and product's hygienic requirements for protecting consumer's health.

References:

- 1) **Branson X. 1983.** Introduction to Agricultural Marketing. Mcgraw-Hill College (August 1983). http://www.amazon.com/Introduction-Agribusiness-Marketing-George-Seperich/dp/0134863828/ref=sr_1_3?s=books&ie=UTF8&qid=1390949130&sr=1-3&keywords=Introduction+to+Agricultural+Marketing .
- 2) **Kohls, Richard L., and Joseph N. Uhl. 1990.** Marketing of Agricultural Products, 7th ed., Macmillan. New York. U.S.A.
http://www.amazon.com/Marketing-Agricultural-Products-Richard-Kohls/dp/0130105848/ref=sr_1_1?s=books&ie=UTF8&qid=1390949162&sr=1-1&keywords=marketing+of+agricultural+products
- 3) **Carter S. 1997.** Global Agricultural Marketing Management (Marketing & Agribusiness Texts Series (Series 09005676 No. 3)). Food & Agriculture Org (January 1998). http://www.amazon.com/Agricultural-Marketing-Management-Agribusiness-09005676/dp/9251040133/ref=sr_1_1?s=books&ie=UTF8&qid=1390949187&sr=1-1&keywords=Global+Agricultural+Marketing+Management

8.8. Courses of Food Science Department (FS 07):

Course Name: Food and Dairy Science (Fundamentals) Code: FS 0701

Pre-requisite: (CJ 1201 or AB 0101)

Course Description:

The course aims at acquainting students with fundamentals of food science, importance of food and food products (non-dairy and dairy). Processing from raw materials, chemical reactions, biochemical properties and sanitations. Methods to preserve food. Theory and practice of food manufacture

Course Contents:

- 1) Introduction
- 2) Food manufacture, food spoilage and industrial solutions.
- 3) Food manufacture in Egypt and Arab countries, and food deficiency.



- 4) Food components.
- 5) Food preservation, by chilling, freezing, drying, additives and canning.
- 6) Cereal technology and bakery products
- 7) Edible-oil technology
- 8) Carbonated beverages, juice, and jams.
- 9) Manufacture of condensed and dried milk.
- 10) Milk, as food and an agricultural product.
- 11) Milk chemical composition.
- 12) Milk production, handling and treatment.

References:

- 1) **Walstra, P., Wouters, J.T. and Geurts, T.J. 2006.** Dairy Science and technology. 2nd Ed CRC/Taylor and 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) **Vickie A. Vaclavik, Elizabeth W. and Christian 2007.** Essentials of Food Science (Food Science Text Series), 3rd edition, Springer. http://www.amazon.com/Essentials-Food-Science-Text/dp/1461491371/ref=sr_1_2?s=books&ie=UTF8&qid=1390949420&sr=1-2&keywords=Essentials+of+Food+Science
- 3) **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

Course Name: Food Toxicology (Code: FS 0702)

Pre-requisite: FS 0701

Course Description:

The course provides students with an interactive overview of the general principles of food toxicology, with emphasis on different types of food-borne toxicants and their adverse effects on human. It furnishes students with analytical



skills and conceptual framework to understand and assess Food safety assurance strategies, especially regarding their importance within food-related industries.

Course Content

- 1) Principles of classification of toxic agents; characteristics of exposure; evaluation of toxicity: LD50 and TD50; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity.
- 2) Natural toxins in food determination of toxicants in foods; classification and toxicity of natural occurring toxins; natural toxins in feed-stuff of animal origin (meat and seafood); or plant origin fungal toxins (mycotoxins); microorganisms and food; sites of action and toxicity mechanisms.
- 3) Food allergies and sensitivities; natural sources and chemistry of food allergens; true/untrue food allergens; handling food allergy; food sensitivity (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); issues related to sulfites in foods.
- 4) Environmental contaminants including residues of drugs, fungicides and pesticides in food and heavy metals and their impact on health; veterinary drug abuse (e.g. malachite green in fish).
- 5) Food additives and toxicants formed during food processing safety of food additives; toxicological evaluation of food additives; food processing generated toxicants such as nitroso-compounds, heterocyclic amines.
- 6) Dietary supplements and toxicity related to dose common dietary supplements; relevance of the dose; possible toxic effects.
- 7) Safety of genetically engineered food; i.e. Food produced from genetically modified organisms (GMO).
- 8) Negative opinions about GMO foods and their potential toxicity; principles of substantial equivalence in safety evaluation of GMO foods.

References:

- 1) **Helferich, W. and Winter, C.K. 2010.** Food toxicology. Taylor & Francis. http://www.amazon.com/Food-Toxicology-William-Helferich/dp/0849327601/ref=sr_1_3?s=books&ie=UTF8&qid=1390949494&sr=1-3&keywords=Food+toxicology



- 2) **Deshpande, S.S. 2002.** Handbook of food toxicology. Marcel Dekker Ltd, NY, USA. http://www.amazon.com/Handbook-Food-Toxicology-Science-Technology/dp/0824707605/ref=sr_1_1?s=books&ie=UTF8&qid=1390949535&sr=1-1&keywords=handbook+Food+toxicology

Course Name: Dairy Technology 1 (Liquid Milk and its Treatments) Code: FS 0703

Pre-requisite: (FS 0701)

Course Description:

The course concerns the importance of milk as an agricultural product, its synthesis and secretion. Its nutritive values, spoilage factors, defects and transferable diseases to human and treatments are also given

Course Contents

- 1) Milk as an agriculture product and its synthesis secretion and nutritional value
- 2) Transferable diseases from milk to human
- 3) Heat treatments and effect on milk properties and nutrient value.
- 4) Spoilage and defects of drinking milk.
- 5) Special codex and legal aspects for liquid milk and dairy factories
- 6) Preparation of artificial milk and its use in some foods.

References:

- 1) **Varn Am, A.H. and Sutherland, J.P. 2009.** Milk and milk products: Technology, chemistry and microbiology. Springer, NY, USA. http://books.google.com.eg/books?id=WorGTC1YjsIC&printsec=frontcover&dq=Milk+and+milk+products&hl=en&sa=X&ei=KmjpUsqHDMng7Qah-YHoCQ&redir_esc=y#v=onepage&q=Milk%20and%20milk%20products&f=false
- 2) **Early, R. 1997.** Technology of dairy products. Springer; 2nd Ed. Springer, NY, USA. http://books.google.com.eg/books?id=BuR28Y-S4SMC&printsec=frontcover&dq=Technology+of+dairy+products&hl=en&sa=X&ei=PmjpUoKdN_Pb7Aaah4CYCw&ved=0CDMQ6AEwAA#v=onepage&q=Technology%20of%20dairy%20products&f=false



Course Name: Dairy technology 2 (Cheese Technology) (Code: FS 0704)

Pre-requisite: FS 0701

Course Description:

The course provides an introduction about cheese making and raw materials used in making different types of cheese. It gives basic education and practical training in cheese technology so as to help students gain the necessary skills for making cheese, and acquire sensory evaluation and scales of related aspects.

Course Content

- 1) Raw materials used in cheese making
- 2) Milk components and their role in cheese making
- 3) Classification of cheese, and lines for making different types.
- 4) Principal steps of cheese making and the aim of each step
- 5) Cheese ripening and chemical, physical, and microbiological changes during the process.
- 6) Sensory evaluations of cheese
- 7) Local and international legislations of cheese.
- 8) Training for making different types of cheese

References:

- 1) **Fox P.F. , McSweeney P.L.H. , Cogan, T.M. and Guinee, T.P. 2000.** Fundamentals of cheese science Springer, NY. USA.
<http://books.google.com.eg/books?id=-oRp5VCVTQQC&pg=PA552&dq=Fundamentals+of+cheese+science+Springer&hl=en&sa=X&ei=V2jpUuPzAcP17AarqYDwDg&ved=0CCoQ6AEwAA#v=onepage&q=Fundamentals%20of%20cheese%20science%20Springer&f=false>
- 2) **WilbeyR.A., Scott J.E. andRobinsonR.K. 1998.** Cheese making practice (Chapman & Hall NY,USA
<http://books.google.com.eg/books?id=NEltzh7YTqAC&printsec=frontcover&dq=Cheese+making+practice&hl=en&sa=X&ei=cGjpUquzIKvG7Ab9ooCIDg&ved=0CCwQ6AEwAA#v=onepage&q=Cheese%20making%20practice&f=false>



Course Name: Dairy technology3 (Fermented Milks and By-Products) (Code: FS 0705)

Pre-requisite:

Course Description:

The course provides students with information on milk fermentation and the raw materials used in making fermented milk. It gives basic education on technology of fermented milk and dairy by-products, and qualifies student to gain the skills of making different fermented milks. It reviews the sensory evaluations for fermented milks and dairy by-products and the scales relating different sectors for continued training in fermented milks and dairy by-products.

Course Content

- 1) Fermented milks and their rots
- 2) Most important bacteria and yeasts used in fermented milks
- 3) Health benefits from using fermented milks.
- 4) National and international kinds of fermented milk and methods of their making.
- 5) Dairy by-products (composition and utilization)
- 6) 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=0CC8Q6AEwAQ>
- 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=oGjpUoWiOIS7Qb7yYCwAQ&ved=0CCoQ6AEwAA#v=onepage&q=Manufacturing%20yogurt%20and%20fermented%20milks&f=false>



Course Name: Food and Dairy Chemistry (Code: FS 0706)

Pre-requisite: (FS 0701)

Course Description:

The course aims at acquainting students with food and dairy chemistry and sampling of substances to obtain their chemical composition. Changes in food and dairy components roles in food processing are mentioned. Components of fat, proteins, carbohydrates and minerals, vitamins, enzymes are mentioned. Relationships between food components and nutrition value are discussed.

Course Contents

- 1) Introduction; importance, relationship between food chemistry and other sciences.
- 2) Sampling methods tools, preservation and amounts.
- 3) Food browning, reasons, resistance of, useful and harmful kinds
- 4) Enzymes roles in food industry, factors affecting their activity, application in food industry, useful and harmful kinds.
- 5) Preparation and storage of chemical reagents, solutions and indicators
- 6) How can laboratory designs affect food analysis?

References:

- 1) **Jenness R., Marth E.H., Wong N.P. and Keeney, M. 1995.** Fundamentals of dairy chemistry. 3rd Ed., Springer, NY, USA.
<http://books.google.com.eg/books?id=uP2TYNs3wWoC&printsec=frontcover&dq=Fundamentals+of+dairy+chemistry&hl=en&sa=X&ei=t2jpUuitFKGa7QbRmIB4&ved=0CCoQ6AEwAA#v=onepage&q=Fundamentals%20of%20dairy%20chemistry&f=false>
- 2) **de-Man J.M. 1999.** Principles of food chemistry. Springer, NY, USA
http://books.google.com.eg/books?id=pRw_AAAAQBAJ&printsec=frontcover&dq=Principles+of+food+chemistry&hl=en&sa=X&ei=1GjpUqLaErCv7AaF5IHIDQ&ved=0CCoQ6AEwAA



Course Name: Food Technology 1 (Sugar and Confectionary) Code: FS 0707

Pre-requisite: FS 0701

Course Description:

The course teaches students the principles of chemistry, biology and engineering of sugar and confectionery industry. Raw material components of sugars and confectioneries, handling, methods of chemical and microbiological analysis, chemical reactions and biochemical properties and sanitation are involved..

Course Contents

- 1) Sugar Industry in Egypt and Arab countries
- 2) Introduction to confectionery manufacture
- 3) Utilization of sugar.
- 4) Sugar cane and sugar beet production and quality.
- 5) Raw sugar manufacturing: Unit operations-juice extraction, purification, evaporation, crystallization, centrifugation, drying and packaging.
- 6) Refining: clarification, de-colorization crystallization, centrifugation, drying, packaging and storage.
- 7) Factors affecting sugar processing.
- 8) Indigenous technology of small scale sugar production.
- 9) Quality criteria for raw and refined sugar.
- 10) Glucose syrups and starch hydrolysates
- 11) Artificial sweeteners
- 12) Confectionery basic and additional ingredients
- 13) Preparation of candy, toffee, chocolates, and other sugar-based confectionery.
- 14) Flour confectionery manufacture
- 15) Date products and confectionery
- 16) Special products such as tea and coffee.
- 17) Recipe and process suggestions of sugar and confectionery
- 18) Sugar and confectionery processing equipment

References:



- 1) **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>
- 2) **William, P.E. 2000.** The Science of sugar confectionery. 1 Ed. Royal Society of Chemistry (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>

Course Name: Food Technology 2 (Cereals and Oils) (Code: FS 0708)

Pre-requisite: FS 0701

Course Description:

This course deals with cereals and their processing, their products including flour, oils, fats and other products and their quality evaluation. Production processes, tests the differentiation between oils and fats and their nutritional value as well as standard properties are included. Also methods extraction of oils and fats and refining methods are given.

Course Content

- 1) Structure and chemical composition of cereals.
- 2) Classification the wheat according to characteristics
- 3) Rice and wheat milling processes, nutrition attributes of wheat flour and flour improvers
- 4) Raw materials which inter in cereal products, breakfast cereals and other baked products, their nutritional values and technological use of wheat, maize, sorghum and barley.
- 5) Bread, macaroni, biscuits and cake manufacture.
- 6) Test procedures relating cereals and their products and their physical parameters
- 7) Source of oils and fats, their chemical composition and determination of their ether extract percentage and methods of their extraction.



- 8) separation of gums and waxes in raw oils and fats, bleaching, deodorization and winterization processes
- 9) Oil and fat spoilage 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-ae7AaSsIDgCQ&ved=0CCoQ6AEwAA
- 2) **O'Brien R.D. 2010.** Fats and oils: Formulating and processing for applications. 3rd Ed. Taylor and Francis. <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>

Course Name: Food Technology 3 (Meat, Fish and Poultry) (Code: FS 0709)

Prerequisite: (FS 0701)

The course provides information on pathogens and spoilage of relating meat, fish and dairy food products. Basic bacteriological tests of such products milk are classified and characterized. Pathogens and bacteria causing spoilage are mentioned. Problems relating food microbiology are addressed.

Course Contents:

- 1) Introduction on importance of meat, fish and dairy as foods, and food microbiology.
- 2) Classification and characterizations of the important microorganisms in milk and its product.
- 3) Pathogens and spoilage bacteria of dairy products.
- 4) Issues of Food safety, food preservation, food production and antimicrobial agents relating meat, fish and dairy products.



- 5) Relationship between biological agents in meat, fish and dairy food and illness.
- 6) Microbiology of fish, meat and fish and relation with spoilage.
- 7) Contamination by microorganisms. Food borne diseases caused by non-spore forming bacteria.

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 fish. Read Books Design
<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. 1997.** Healthy production and processing of meat, poultry and fish products. Advances in Meat Res, Vol. 11, 1st Ed. 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>

Course Name: Risk Assessment and Quality Control (Code: FS 0710)

Pre-requisite: FS 0701

Course Description:

This course focuses on risk assessment in food and food chain in standard industrial companies working in food production. Quality control approaches and their protocols are included exhibiting the importance of risk assessment in designing systems.

Course Content



- 1) Risk assessment in food production.
- 2) Physical and chemical risks and hazard identification
- 3) Risk assessment procedure and dose-response assessment
- 4) Exposure assessment and evaluation.
- 5) Quality control procedures, protocols and new systems
- 6) System effect on quality and safety of food and 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 Academic 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>

Course Name: Food and Dairy Microbiology (Code: FS 0711)

Pre-requisite: FS 0706

Course Description:

The course reviews important microorganisms in food and dairy products, and their co-operative activities differentiating between pathogenic, and nonpathogenic. It provides bacteriological tests for food and dairy products, food preservation, and antimicrobial agents. Food-borne diseases, infections and intoxications are also.

Course Content

- 1) Introduction to food and dairy microbiology.
- 2) Food microbiology and public health.



- 3) Classification and characterizations of important microorganisms non-dairy and dairy food.
- 4) Factors affecting on bacterial growth.
- 5) Food contamination by microorganisms.
- 6) Control of microbial agents in food and dairy products.
- 7) Food spoilage patterns
- 8) Food borne diseases caused by spore-forming bacteria.
- 9) Food borne diseases caused by non-spore forming bacteria.
- 10) Detection bacteria in food and raw materials.

References:

- 1) **Leo R. Diliello 1982.** Methods in Food and Dairy Microbiology. AVI Publishing Company.
<http://books.google.com.eg/books?id=II5DHCE2YW4C&printsec=frontcover&dq=Methods+in+Food+and+Dairy+Microbiology&hl=en&sa=X&ei=jGrpUvC1BNGI7AbL44DgCg&ved=0CC4Q6AEwAQ#v=onepage&q=Methods%20in%20Food%20and%20Dairy%20Microbiology&f=false>
- 2) **Wilkie F. Harrigan 1998.** Laboratory Methods in Food Microbiology, Third Edition. Academic Press.
<http://books.google.com.eg/books?id=II5DHCE2YW4C&printsec=frontcover&dq=Laboratory+Methods+in+Food+Microbiology&hl=en&sa=X&ei=2GrpUr6mPIfe7AaA5YGoBg&ved=0CDMQ6AEwAA>

Course Name: Unit Operations in Food Processing (Code: FS 0712)

Pre-requisite: FS 0701

Course Description:

The course gives the basics regarding unit operation in food processing; and views the designs under optimal conditions. Application of principles of food engineering and equipment for physical transformation are given. Developing scientific and technical knowledge for improvement of food industry is included. Unit operation explains the principles of operations and illustrates them by individual processes. Technological ideas and engineering concepts are given illustrating their use.

Course Contents

Food Safety Program



- 1) Food material preparation for processing, and cleaning of units.
- 2) Material handling units such as conveyers and pumps.
- 3) Size reduction units such as mills, dicers, shredders and pulpers,
- 4) Agitating and mixing units such as mixers.
- 5) Separation units such as filters graders and peelers.
- 6) Heating, concentrating and evaporating units
- 7) Heat exchange and steam generating units
- 8) Refrigerating and freezing cooling Units
- 9) Molding, cooling, freezing, drying and freeze-drying units.
- 10) Forming, filling and packaging units
- 11) Controlling and maintenance units
- 12) Dehydration of food

References:

- 1) **George D. Saravacos, and Zacharias B. Maroulis 2011.** Food Process Engineering Operations. CRC Press.
<http://books.google.com.eg/books?id=ODV-USDSPoIC&printsec=frontcover&dq=Food+Process+Engineering+Operations&hl=en&sa=X&ei=8WrpUoTeHpCf7gaVqYHIBQ&ved=0CCoQ6AEwAA>
- 2) **Ibarz, A. 2003.** Unit Operations in Food Processing. CRC Press.
<http://books.google.com.eg/books?id=MACEQgAACAAJ&dq=Unit+Operations+in+Food+Processing&hl=en&sa=X&ei=B2vpUv60KaeV7Aa46oDIBA&ved=0CCoQ6AEwAA>

Course Name: Food Preservation (Code: FS 0713)

Pre-requisite: AE 1101

Course Description:

This course provides an understanding of food spoilage and the purpose of food preservation and its methods. Related scientific principals in this regards and preparation methods for raw food materials are included.

Course Contents

- 1) Introduction, classification of foods and food spoilage.



- 2) Source of Food raw materials: source preparation and methods of obtaining them.
- 3) Classification of preservation methods: refrigeration, freezing, drying, freeze-drying irradiation and, preservative addition.

References:

- 1) **ShafiurRahman M 2007.** Handbook of Food Preservation, Second Edition (Food Science and Technology) CRC Press; 2nd Edition (July 16, 2007).
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 (August 30, 2004).
http://books.google.com.eg/books?id=tbxGHBUY0BcC&printsec=frontcover&dq=Food+Processing+and+Preservation&hl=en&sa=X&ei=NWvpUq-eDoPH7Aa_soC4Ag&ved=0CCoQ6AEwAA#v=onepage&q=Food%20Processing%20and%20Preservation&f=false

Course Name: Human Nutrition and Nourishment (Code: FS 0714)

Pre-requisite: (FS 0706)

Course Description:

This course presents general aspects of human nutrition, deficiency of nutrients and associated clinical symptoms, principles elements of human nutrition. Effect of processes on nutritional aspects of food; Functional food properties and new trends in nutrition as well as preparation of balanced meals are all included.

Course Content

- 1) Introduction to human nutrition
- 2) Classification the main components of foods
- 3) Food major and minor components
- 4) Deficiencies and their symptoms
- 5) Requirements of daily allowance of different food items
- 6) Effects of different processing units on nutritional aspects of food.



- 7) Program as complementary food.
- 8) Program for feeding allergic people.
- 9) Program for feeding school student.
- 10) Course review and student presentation.

References:

- 1) **Gibney, M.J., Lanham-New, S.A., Cassidy, A., Cassidy and Vorster, H.H. 2004.** Introduction to human nutrition. John Wiley & Sons, NY, USA.
<http://books.google.com.eg/books?id=Pn7J9JbE4g0C&printsec=frontcover&dq=Introduction+to+human+nutrition&hl=en&sa=X&ei=UWvpUqjrLZSjhgfcoYDYBA&ved=0CCoQ6AEwAA>
- 2) **Medeiros D.M and Wildman, R.E.C. 2011.** Advanced human nutrition. 2nd Ed. Jones & Bartlett Learning, Sudbury, MA, USA.
<http://books.google.com.eg/books?id=s4GEAgAAQBAJ&printsec=frontcover&dq=Advanced+human+nutrition&hl=en&sa=X&ei=aWvpUvzNBMaQ7Ab21oHoDg&ved=0CCoQ6AEwAA#v=onepage&q=Advanced%20human%20nutrition&f=false>

Course Name: Food Legislation (Code: FS 0715)

Pre-requisite: (FS 0701)

Course Description:

The course aims at acquainting the students with laws and regulations concerning food, in Egypt and other countries. Specific references are made to laws and regulations in the Arab countries, and others such as the European Union (EU), the United States of America (USA), China, and Hong Kong. It also develops an awareness of related current issues connected with food additives, use of pesticides and chemicals in agriculture, farm animal disease and other topics.

Course Content

- 1) International food laws and regulation and related issues: the Codex Alimentarius principles and standards; roles of international agencies such as the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Trade Organization (WTO);



- agreements related to Sanitary and Phyto-sanitary Measures (SPS) and Technical Barrier to Trade (TBT).
- 2) Food legislation in Hong Kong: the basic food law, Part V (Food and Drugs) of the public health and municipal service ordinance.
 - 3) Regulations on harmful substances in food, imported meat and poultry, liquid/dried milk, frozen confections, coloring substances, preservatives, sweeteners and other additives; guidelines on food business and labeling.
 - 4) Genetically modified (GM) food, imported food and food recall; microbiological guidelines for ready-to-eat food; code of hygienic practice.
 - 5) Aseptically processed and packaged low-acid foods.
 - 6) Laws on: food quality and food Sanitation

References:

- 1) **Barry Atwood, Katherine Thompson, and Chris Willett 2009.** Food Law: Third Edition Bloomsbury Professional; 3 edition (October 1, 2009). <http://books.google.com.eg/books?id=VF0dAQAAMAAJ&q=Food+Law:+Third+Edition+Bloomsbury+Professional&dq=Food+Law:+Third+Edition+Bloomsbury+Professional&hl=en&sa=X&ei=m2vpUv3LLKiw7QbB8oDwDg&ved=0CDMQ6AEwAA>
- 2) **Neal D. Fortin 2011.** Food Regulation: Law, Science, Policy, and Practice. Willy Blackwell. <http://books.google.com.eg/books?id=XB8Z9wjnlD0C&printsec=frontcover&dq=Food+Regulation&hl=en&sa=X&ei=sWvpUsG0B4-y7AaNtoHYDA&ved=0CDMQ6AEwAA>

Course Name: Functional Dairy Products (Code: FS 0716)

Pre-requisite: (FS 0701)

Course Description:

The course gives an understanding of functional dairy products and their health benefits, and help students to gain skills of preparation of such products and their Ingredients.

Course Content



- 1) Introduction and classification of functional dairy products.
- 2) Functional dairy products and healing properties for some illnesses (cancer, coronary diseases and osteoporosis), probiotics and the management of food allergy.
- 3) Dairy products and immune functions in the elderly
- 4) Therapeutic use of functional ingredients as probiotics in gastrointestinal inflammation Caseino-phospho-peptides (CPPs) as.
- 5) Oligosaccharides, lactic acid bacteria (LAB) in functional dairy products. Conjugated linoleic acid (CLA) as a functional ingredient
- 6) Enhancing functionality of prebiotics and probiotics
- 7) Safety evaluation of probiotics clinical trials
- 8) Markets, consumers and functional food.

References:

- 1) **Shortt, C. and O'Brian, J. 2003.** Handbook of functional dairy products. Taylor and Francis, London, UK.
http://books.google.com.eg/books?id=geXneTZ13w4C&printsec=frontcover&dq=Handbook+of+functional+dairy+products&hl=en&sa=X&ei=2GvpUp_3B8Gr7AbNtIDgCQ&ved=0CCoQ6AEwAA
- 2) **Matto, T., and Dssre M. 2003.** Functional dairy products. ARC Press, London, UK.
<http://books.google.com.eg/books?id=DB0q0ooQxOQC&printsec=frontcover&dq=Functional+dairy+products&hl=en&sa=X&ei=AGzpUvXgIKzQ7Ab2r4GIAw&ved=0CCoQ6AEwAA#v=onepage&q=Functional%20dairy%20products&f=false>

Course Name: Milk Fatty products and Milk Replacement (Code:FS 0717)

Pre-requisite: (FS 0706 &FS 0711)

Course Description:

The course views the basic of definitions, types and chemical composition of cream, butter and samna (ghee). Theories of layer cream formation, methods of making such products, defects during making as well as calculation and modification of the fatty products are all included.

Course Content



- 1) Definition of the products, their different types.
- 2) Chemical and physical properties of cream.
- 3) Cream making methodology, yield calculation, composition modification, and preservation.
- 4) Butter types, chemical and physical properties, theories of making, composition modification, and yield calculation.
- 5) Methodology of making antioxidants and active material preservation and defects
- 6) Samna definition, different types, chemical and physical properties making methodology and theories.
- 7) Use of fat replacers in dairy products

References:

- 1) **Varnam, A. and Jane P. Sutherland 2009.** Milk and Milk Products: Technology, chemistry and microbiology (Food Products Series). Springer; 1994 Edition (October 19, 2009)
<http://books.google.com.eg/books?id=WorGTC1YjsIC&printsec=frontcover&dq=Milk+and+Milk+Products&hl=en&sa=X&ei=H2zpUtONBeey7AaKqIDoDA&ved=0CCoQ6AEwAA#v=onepage&q=Milk%20and%20Milk%20Products&f=false>
- 2) **Phillip Soo Tong 1982.**The replacement of milk fat with polyunsaturated vegetable oil in ice cream and its effects on overrun, fat destabilization and storage stability. Cornell University.
<http://books.google.com.eg/books?id=3FBPAAAAyAAJ&q=The+replacement+of+milk+fat+with+polyunsaturated&dq=The+replacement+of+milk+fat+with+polyunsaturated&hl=en&sa=X&ei=OmzpUuynBdCihgf-74Fg&ved=0CDMQ6AEwAA>

Course Name: Food packaging technology (Code: FS 0718)

Pre-requisite: (FS 0706 &FS 0711)

Course Description:

This course presents principles of food packaging with quality assurance. Basic principles, applications and classification of food packing and packaging materials are included. Properties of packaging raw materials and their chemical



structure and relation with food components and effect on health and environment are included.

Course Contents

- 1) Introduction to food packaging, its fundamentals and development
- 2) Graphic design and printing of food packaging materials
- 3) Manufacture and use of glass, metals, paperboards, plastics and laminates in packaging.
- 4) Closure system packaging and food packaging lines.
- 5) Use of adhesives, package systems of MAP (modified atmospheric packaging), CAP (controlled atmospheric packaging), ROP (reduced oxygen packaging) and VP (vacuum packaging).
- 6) Warehousing-transport-distribution of packaged foods
- 7) Package labeling and drafting of packaging specification sheets
- 8) QA/QC (quality assurance/quality control) tests of packaging materials, and food packaging waste
- 9) Legal requirements for food packaging.

References:

- 1) **Richard Coles, Derek McDowell, and Mark J. Kirwan 2009.** Food Packaging Technology. Wiley, 2009.
<http://books.google.com.eg/books?id=OAA4szVQvsAC&printsec=frontcover&dq=Food+Packaging+Technology&hl=en&sa=X&ei=VWzpUoSGL6v07Abk7IC4CA&ved=0CDMQ6AEwAA#v=onepage&q=Food%20Packaging%20Technology&f=false>
- 2) **Jung H. Han 2005.** Innovations in Food Packaging. Elsevier publisher.
<http://books.google.com.eg/books?id=TJJUaBFhsFsC&printsec=frontcover&dq=Innovations+in+Food+Packaging&hl=en&sa=X&ei=bmzpUqTsGYWL7Aak6oDgDg&ved=0CCoQ6AEwAA#v=onepage&q=Innovations%20in%20Food%20Packaging&f=false>

Course Name: Food and Dairy Sanitation & Quality Control (Code: FS 0719)

Pre-requisite: FS 0706 and FS 0713



Course Description:

The course involves gaining skills for detection of dairy adulteration, knowledge of different dairy standards, training for good manufacturing practices (GMP) to reach high quality products. Acquiring awareness of the importance of food sanitation, quality properties and control, methods measurement, and tests and examinations of raw food and food products are also included. Evaluating safety of water used in food manufacturing, safety of buildings and machines and packaging materials are mentioned.

Course Contents

- 1) Hygienic standards and quality control in food and dairy factories.
- 2) Role of quality control laboratory in dairy factories.
- 3) Quality measures of dairy products and determination and estimation methods of dairy adulteration.
- 4) Designs of food and dairy factories.
- 5) Egyptian food standards.
- 6) Chemicals, physical, and microbiological properties of water and food; sensory evaluation of food.
- 7) Food sanitation: identification and hygiene.
- 8) Food-related disease and food poisoning.
- 9) Detergents used in cleaning food factories
- 10) Methods of waste removal in food factories.
- 11) Health instructions for packing and packaging.
- 12) The hazard analysis & critical control point (HACCP) system.
- 13) The good manufacturing practice (GMP) system.

References:

1. **Hester, R.E., and Harrison, R.M. 2001.** Food safety and Food Quality (Issues in Environmental Science and Technology). Royal Society of Chemistry; 1st Edition (June 28, 2001).
<http://books.google.com.eg/books?id=pW8u5HMULYMC&printsec=frontcover&dq=Food+safety+and+Food+Quality&hl=en&sa=X&ei=lmzpUpihDY6O7QaE9YGIa&ved=0CCoQ6AEwAA>
- 2) **Norman Marriott, Robert B. Gravani** 2006. Principles of Food Sanitation (Food Science Text Series), Springer; 5th edition.



<http://books.google.com.eg/books?id=5SAGXHLPk4wC&printsec=frontcover&dq=Principles+of+Food+Sanitation&hl=en&sa=X&ei=rmzpUsqQMoeP7AbuuICwDA&ved=0CCoQ6AEwAA#v=onepage&q=Principles%20of%20Food%20Sanitation&f=false>

Course Name: Food safety Insurance (Code: FS 0720)

Pre-requisite: FS 0706 FS 0713

Course Description:

The course aims at presenting programs used in food factories to control food products, the principles and critical control points in food processing and the side effect in hygiene. Contamination of food: chemical, biological and natural, and methods of their control. Methods of storage and handling.

Course Contents

- 1) Definition of Food safety and local and international law of food products.
- 2) Relationship between food hygiene and food contamination.
- 3) Methods of quality control of food products.
- 4) Food poisoning caused by contamination.
- 5) Programs used to control food products.
- 6) Critical control point in food processing.
- 7) Application of HACCP system in meat, fish, poultry, vegetable and fruits products
- 8) The importance of food additives and its variation used in food products.
- 9) The international methods used quality control of food products to produce food free from contamination.
- 10) Student presentation and course review.

References:

- 1) **Hester, R.E., and Harrison, R.M. 2001.** Food safety and Food Quality (Issues in Environmental Science and Technology). Royal Society of Chemistry; 1 edition (June 28, 2001)
<http://books.google.com.eg/books?id=pW8u5HMULYMC&printsec=frontcover&dq=Food+safety+and+Food+Quality&hl=en&sa=X&ei=0WzpUvrJLKbT7Ab9l4GwBg&ved=0CCoQ6AEwAA#v=onepage&q=Food%20safety%20and%20Food%20Quality&f=false>
- 2) **Stuart A. Kallen 2004.** Food safety. Green haven; 1st Edition (November 12, 2004) <http://books.google.com.eg/books?id=h->



[yEWb26mmUC&printsec=frontcover&dq=Food+safety&hl=en&sa=X&ei=6mzpUu34OY_H7Ab72IHADA&ved=0CDMQ6AEwAA#v=onepage&q=Food%20safety&f=false](http://www.menoua.edu.eg/food-safety/)

Course Name: Condensed & Dried Milks and Ices (Code: FS 0721)

Pre-requisite: (FS 0706 or FS 0713)

Course Description:

The course emphasizes the importance of condensed & dried milk and ice, gives methods for their manufacture, calculate and prepare ice-cream mixes. It also gives modifications of milk chemical composition before and after condensing or drying. It provides students with basic different instruments used in manufacture.

Course Contents

- 1) Condensed and evaporated milk manufacture
- 2) Spray and roller dried milk manufacture
- 3) Instant milk powder processing
- 4) Identification and classification of different kinds of ice-cream.
- 5) Raw materials needed for processing
- 6) Processing methods and ice cream mixes calculation
- 7) Judging of products and defects of condensed & dried milk and ice

References:

- 1) **Milk Ind. Found. Staff 2005.** Analysis of Milk and Its Products: A Lab Manual. Biotech Books; 2nd Revised edition edition (January 1, 2005)
http://books.google.com.eg/books?id=zpOumRS_3qkC&dq=Analysis+of+Milk+and+Its+Products&hl=en&sa=X&ei=AG3pUpr2Neyp7Aaz9IGwAw&ved=0CDMQ6AEwAA
- 2) **Varnam, A., and Jane P. Sutherland 2009.** Milk and Milk Products: Technology, chemistry and microbiology (Food Products Series) Springer; 1994 edition (October 19, 2009)
http://books.google.com.eg/books?id=WorGTC1YjsIC&printsec=frontcover&dq=Milk+and+Milk+Products&hl=en&sa=X&ei=Fm3pUsrXOOGK7Aag_oCYAg&ved=0CCoQ6AEwAA#v=onepage&q=Milk%20and%20Milk%20Products&f=false

Course Name: Food Nanotechnology (Code: FS 0722)

Pre-requisite: (FS 0701)



Course Description:

The course gives students a comprehensive understanding of nanotechnology and the basics of new detection methods. To know nanotechnology application in food processing as well as application and risks of food nanomaterials used in food applications.

Course Content

- 1) Introduction and applications to food nanotechnology.
- 2) Bio-nano-technology application in food manufacturing and inspection.
- 3) Potential food applications: Nanotechnology in the food industry.
- 4) Nanoencapsulation and nano-biosensor.
- 5) Nano emulsion, structured multilayer emulsions, and laminates: edible coatings. Bio polymeric Nanoparticles.
- 6) Nano-packaging.
- 7) Antimicrobial food packaging types, and detection of foodborne pathogens and their toxins.
- 8) Detection of chemicals and contaminants.
- 9) Regulations on safety of nano-products and risk assessment of nanomaterials in food.
- 10) Nanotechnology in the food Market

References:

- 1) **Fulekar, M.H. 2010.** Nanotechnology: Importance and applications. I.K. International Publ. House Pvt. Lts., New Delhi, India.
<http://books.google.com.eg/books?id=wYie57y1zj8C&printsec=frontcover&dq=Nanotechnology:+Importance+and+applications&hl=en&sa=X&ei=S23pUpWrC6rX7Abs14CIAw&ved=0CCoQ6AEwAA#v=onepage&q=Nanotechnology%3A%20Importance%20and%20applications&f=false>
- 2) **Chaudry, Q., Castle, L. and Watkins, R. 2010.** Nanotechnologies in food. Royal Society of Chemistry (CRC), Cambridge, UK.
http://books.google.com.eg/books?id=p3Gi7ccwCWAC&printsec=frontcover&dq=Nanotechnologies+in+food&hl=en&sa=X&ei=YW3pUt2_JuTR7AaMs4HYBg&ved=0CC4Q6AEwAQ#v=onepage&q=Nanotechnologies%20in%20food&f=false

Course Name: Computer Applications in Food safety (Code: FS 0723)

Pre-requisite: CJ 1203

Food Safety Program



Course Description:

This course focuses on globalization of Food safety which could be standardized using computer application. Huge amounts of food should be produced daily high level of safety and quality conceding food security. The use of computer in this trend is standardized for food specification.

Course Content

- 1) Risk assessment in food production.
- 2) Physical and chemical procedure, hazard identification, dose-response assessment, exposure assessment, and risk assessment evaluation using computer.
- 3) Quality control procedures, protocols and HACCP, new systems in quality control using computer.
- 4) Quality evaluation for meat, fish, poultry, egg, vegetables, fruits, cereals and others.
- 5) Using computer technology in food processing, handling and distribution.

References:

- 1) **Bhattachajee, A.K., Mukherjee, S. and Brookshear, J.G. 2012.** Computer Science. Pearson Education Ltd. London, UK.
<http://books.google.com.eg/books?id=pbqEAcMJQ8YC&printsec=frontcover&dq=Computer+Science&hl=en&sa=X&ei=fW3pUu2ZFoTb7AbB1YHoAg&ved=0CD0Q6AEwAQ#v=onepage&q=Computer%20Science&f=false>
- 2) **Lalanda, P., McCann, J.A., and Diaconescu, A. 2013.** Autonomic Computing: Principles, design and implementation. Springer-Verlag London, UK.
<http://books.google.com.eg/books?id=r3R3MAEACAAJ&dq=Autonomic+Computing&hl=en&sa=X&ei=nG3pUpyCFPOS7AbQ6IDgDQ&ved=0CDIQ6AEwAQ>

Course Name: Food additives

(Code: FS 0724).

Pre-requisite: (FS 0711)



Course Description:

The objective of this course is to understand the basic principles and applications of food additives as well as to classify the food additives according to their chemical, physical and microbiological characteristics. Illustrate the effect of consuming of these additives on consumer's health and environment. Moreover, to contribute to the development of scientific and the technological knowledge needed for the growth and improvement of the food industry.

Course contents

- 1) Introduction: What are Food Additives? - Role of Food Additives in Food Processing -functions - Classification - Intentional & Unintentional Food Additives
- 2) Toxicology and Safety Evaluation of Food Additives - Beneficial effects of Food Additives /Toxic Effects - Food Additives generally recognized as safe (GRAS) - Tolerance levels &Toxic levels in Foods - LD 50 Values of Food additives.
- 3) Naturally occurring Food Additives - Classification - Role in Food Processing – Health Implications.
- 4) Food colors - What are food colors - Natural Food Colors – Synthetic food colors - types -their chemical nature - their impact on health.
- 5) Preservatives - What are preservatives - natural preservation-chemical preservatives – their chemical action on foods and human system.
- 6) Anti-oxidants & chelating agents - what are anti oxidants - their role in foods - types of antioxidants - natural & synthetic - examples - what are chelating agents - their mode of action in foods - examples.
- 7) Surface active agents - What are surface active agents - their mode of action in foods -examples.
- 8) Stabilizers & thickeners - examples - their role in food processing.
- 9) Bleaching & maturing agents: what is bleaching - Examples of bleaching agents - What is maturing - examples of maturing agents - their role in food processing.



- 10) Starch modifiers: what are starch modifiers - chemical nature - their role in food processing.
- 11) Buffers - Acids & Alkalis - examples - types - their role in food processing.
- 12) Sweeteners - what are artificial sweeteners & non nutritive sweeteners - special dietary supplements & their health implication - role in food processing.
- 13) Flavoring agents - natural flavors & synthetic flavors - examples & their chemical nature - role of flavoring agents in food processing.
- 14) Anti-caking agents - their role in food processing
- 15) Humectants - definition on their role in food processing.
- 16) Clarifying agents - definition examples - their role in food processing

References:

- 1) **Fergus M. Clydesdale 1996.** Food Additives: Toxicology, Regulation, and Properties. CRC press
<http://books.google.com.eg/books?id=Be4kTSsgiRYC&printsec=frontcover&dq=Food+Additives&hl=en&sa=X&ei=um3pUqrEAs6A7QbftoC4Aw&ved=0CEQQ6AEwAQ#v=onepage&q=Food%20Additives&f=false>
- 2) **Mahindru, S.N. 2009.** Food Additives. APH Publishing
<http://books.google.com.eg/books?id=87XK5Uwvs94C&printsec=frontcover&dq=Food+Additives&hl=en&sa=X&ei=um3pUqrEAs6A7QbftoC4Aw&ved=0CEoQ6AEwAg#v=onepage&q=Food%20Additives&f=false>

Course Name: Industrial Fermentation (Code: FS 0725).

Pre-requisite: (FS 0711)

Course Description:

The course is aiming to know the importance of microbial industries technology and factor affecting in growth of organisms used in fermentation. Understanding the fermentation process and type as well as utilization the agriculture and food industrial waste could be studied. Moreover, evaluate the safety of fermented products. Give an overview about the fermented food and produced food additives by fermentation.



Course contents:

- 1) Introduction of food industrials: introduction, importance, advanced and trends and application.
- 2) Fermentation: types, equipments, factor affecting, fermentation control and condition.
- 3) Food industrials and agriculture waste: type, source and characteristics of these wastes.
- 4) Production of alcoholic beverages, industrial alcohols, baker yeast, different kind of breads and related products
- 5) Production of fermented meat, fish, vegetable products. Production of organic acid.
- 6) Production of enzymes and antibiotics.
- 7) Other microbial used products: sweeteners, flavors, amino acids, vitamins.
- 8) Safety evaluation of novel food fermented products

Reference:

- 1) **Zhiqiang A.N. (2005).** Handbook of Industrial Mycology. Marcel Dekker New York.
<http://books.google.com.eg/books?id=0w3vwzkXVVYC&printsec=frontcover&dq=Handbook+of+Industrial+Mycology&hl=en&sa=X&ei=Em7pUp-WIo2M7Aa-tlGoDw&ved=0CCoQ6AEwAA>
- 2) **Jacqueline, H.B.; Michele, F.M.; Elizabeth, J.T. and Huang, J.C. (2007)** Accelerating new food product design and development. Publishing by Blackwell.
<http://books.google.com.eg/books?id=WVOsNG6IAkUC&printsec=frontcover&dq=Accelerating+new+food+product+design+and+development&hl=en&sa=X&ei=J27pUoaRCcSy7AaO5IGwAw&ved=0CCoQ6AEwAA#v=onepage&q=Accelerating%20new%20food%20product%20design%20and%20development&f=false>
- 3) **Martin R. Adams (2001).** Fermentation and Food Safety. AN ASPEN PUBLICATION Aspen Publishers, Inc. Gaithersburg, Maryland.
http://books.google.com.eg/books?id=n6ThzC91_8C&dq=Fermentation



[+and+Food+Safety&hl=en&sa=X&ei=QG7pUquIGuf07Abap4CIBQ&ved=0CCoQ6AEwAA](http://www.google.com/search?q=and+Food+Safety&hl=en&sa=X&ei=QG7pUquIGuf07Abap4CIBQ&ved=0CCoQ6AEwAA)

8.9. Courses of Agricultural Botany Department (AB 08)

Course Name: Botany (Code: AB 0801)

Prerequisite: (CJ 1201)

Course Description:

The course aims of giving the knowledge of Botany and its branches, external morphology for flowering plants and organs 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 also given.

Course Contents:

- 1) General introduction on botany and its branches, external morphology for flowering plants (roots, stem and leaves) organs modification.
- 2) Plant cell, plant tissue (merastematic, epidermis, paranchematic, cholarancheima, schelarancheima, secretion and vascular tissues) types of vascular bundles.
- 3) Anatomy of flowering plants (root, stem and leaves in mono and dicot plants) primary and secondary growths.
- 4) Effect of environment on external and internal morphology (hydrophytes and xerophytes).
- 5) Pollination and fertilization.
- 6) Taxonomy and plant kingdom specially regional and horticultural plants.
- 7) Cruciferae, Leguminaceae, Cucurbitaceae, Solonaceae, Malvaceae, Elementary Knowledge of mosses, ferns, fungi, bacteria.

References:

- 1) **Singh, M.P. and Sarma, A. K. 2005.** Textbook of Botany, Anmof Publications Pvt.LTD.New Delhi.
<http://books.google.com.eg/books?id=fTf6XaCWY5UC&dq=Textbook+of+Botany&hl=en&sa=X&ei=Wm7pUuznNsXm7AbLuIGIBQ&ved=0CCoQ6AEwAA>
- 2) **Stern, K. R. 2000.** Introductory Plant Biology (8. Edition). Mc Grow-Hill Companies, London: U. K.



<http://books.google.com.eg/books?id=ZUEJPwAACAAJ&dq=Introductory+Plant+Biology&hl=en&sa=X&ei=d27pUpW3GqLm7AaA2YGIBA&ved=0CDEQ6AEwAQ>

- 3) **Bold, H.C. 1989.** The Pant Kingdom (5.Edition). Prentice-Hall International, London: U. K.

<http://books.google.com.eg/books?id=6CBFAQAIAAJ&q=The+Plant+Kingdom&dq=The+Plant+Kingdom&hl=en&sa=X&ei=jm7pUun3KaSK7Abj8oDoCw&ved=0CDIQ6AEwAQ>

Course Name: Agricultural Microbiology (Code: AB 0803)

Prerequisite: (AC 0901)

Course Description:

The course makes the student acquainted with the science of microbiology and the role of microorganisms in agriculture. Different microorganisms including bacteria, fungi, alga, virus are described along with their taxonomy, function, behavior and other related information are involved.

Course Contents:

- 1) Introduction to applications of microbiology in agriculture.
- 2) Organic manures, farmyard manure, and composts and importance to soil fertility.
- 3) Biofertilizer and biofertilization: Microorganisms used as biofertilizers: (a) N₂ fixing micro-organisms including bacteria, cyanobacteria, azolla, and frankia. (b) P-dissolving microorganisms including bacteria and fungi. (c) Silicate-dissolving microorganisms. (d) S-oxidizing microorganisms.
- 4) Inocula preparation: Preparation of Rhizobia, Azotobacter, Cyanobacteria, Azolla, Frankia, Azospirillum inocula, Phosphate-solubilizing inocula.
- 5) Composting and compost preparation: Manure composts, biogas composts and its use as a manure. City refuses compost. Green manure
- 6) Silage production as animal feed stuff
- 7) Rotting of fiber plants.
- 8) Biological control: Microorganisms used in biological control and their application.

References:



- 1) **Garrity, G.M., Brenner, D.J., Krieg, N.R. and Staley, J.T.** 2005. *Bergey's manual of systematic bacteriology*. 2nd Ed., Springfield, NY, USA. <http://books.google.com.eg/books?id=0kghF7qBE98C&printsec=frontcover&dq=Bergey%E2%80%99s+manual+of+systematic+bacteriology&hl=en&sa=X&ei=rW7pUpTcH4OP7Aay-oCIDQ&ved=0CCoQ6AEwAA#v=onepage&q=Bergey%E2%80%99s%20manual%20of%20systematic%20bacteriology&f=false>
- 2) **Dworkin, M., Falkow, S. E., and Rosenberg, K**2006. *The prokaryotes*. Springer, NY, USA. <http://books.google.com.eg/books?id=C5tzLBabUh8C&printsec=frontcover&dq=The+prokaryotes&hl=en&sa=X&ei=xm7pUojgI-rH7Aak9oD4Dw&ved=0CCoQ6AEwAA>

Course Name: Applied Microbiology (Code: AB 0805)

Prerequisite (AB 0803)

Course description:

The course concerns applications of microbiology in agriculture. Different applications include fertilization using micro-organisms (bio-fertilization), feedstock materials (e.g.) silage, and composting.

Course Contents:

- 1) Introduction to applications of microbiology in agriculture.
- 2) Organic manures, farmyard manure, and composts and importance to soil fertility.
- 3) Biofertilizer and biofertilization: Microorganisms used as biofertilizers (N₂-fixers, P-dissolvers, Silicate-dissolvers, S-oxidizers)
- 4) Inocula preparation: (Rhizobia, *Azotobacter*, Cyanobacteria, *Azolla*, *Frankia*, *Azospirillum*, P-dissolvers).
- 5) Composting and compost preparation.
- 6) Silage production as animal feed stuff.
- 7) Rotting of fiber plants.
- 8) Biological control: Microorganisms used in biological control and their application.



- 9) Aquatic, dairy, food, air microbiology.
- 10) Examination for *Azotobacter Rhizobia*, *Bacillus megaterium* and lactic acid bacteria and moulds.
- 11) Microbial toxins Food and Air borne pathogens
- 12) Determination of fermentative enzymes.
- 13) Water microbial contamination

References:

- 1) **Roberts, D. 1995.** Practical food microbiology, Public Health Laboratory Service, London. UK.
<http://books.google.com.eg/books?id=zFHncTTJjEC&printsec=frontcover&dq=Practical+food+microbiology&hl=en&sa=X&ei=527pUrmlPK3b7AbYrIC4Ag&ved=0CCoQ6AEwAA#v=onepage&q=Practical%20food%20microbiology&f=false>
- 2) **Collins, C.H., Lyne, P.N., and Granger, J.M. 1995.** Microbiological methods. 7th Ed. CRC Press, London, UK.
http://books.google.com.eg/books?id=V1VrAAAAMAAJ&q=Microbiological+methods&dq=Microbiological+methods&hl=en&sa=X&ei=AW_pUrxD-re7AaMIHwAg&ved=0CDUQ6AEwAg
- 3) **Clazer, A.N. and H. Nikaido 1998.** Fundamentals of Applied Microbiology. W.H. Freeman and Company, New York.
http://books.google.com.eg/books?id=o3HnX18eU3AC&printsec=frontcover&dq=Fundamentals+of+Applied+Microbiology&hl=en&sa=X&ei=Gm_pUta0IrOI7AbB1IHocw&ved=0CCoQ6AEwAA#v=onepage&q=Fundamentals%20of%20Applied%20Microbiology&f=false

Course Name: Plant physiology & pathology (AB 0808)

Pre-requisite: (AB 0801)

Course Description:

The course concerns the physiological activities in plant organs. Photosynthesis, plasmolysis, Transpiration, water and nutrient uptake, metabolic activities and other activities are covered. Pathology of plants is covered. Basic symptoms of major plant diseases in some important crops are reviewed.



Fundamental concepts of plant disease-development and the associated pathogens are introduced. Common diseases in Egypt as well as tropical and subtropical countries are mentioned.

Course Content

- 1) Introduction.
- 2) Plant cell as a physiologic unit.
- 3) Diagnosis of plant disease.
- 4) Plant water relations.
- 5) Photosynthesis.
- 6) Plant growth and growth hormones in plant (e.g. gibberellins, cytokines ethylene, abscisic acid) and their function.
- 7) Photo-periodism, Vernalization and Senescence.
- 8) Stress Physiology.
- 9) Plant disease, diagnosis, importance and classification.
- 10) Parasitism and how pathogens attack plant.
- 11) Environment and plant disease, and disease management.
- 12) Plant disease in tropic and subtropic regions.
- 13) Specific plant diseases (caused by bacteria, virus, fungus, fungi, oomycetes, zygomycetes, ascomycetes and, basidiomycetes).

References:

- 1) **Jain, V.K. 2005.** Fundamentals of plant physiology. S. chand & Company LTD. Ramnagar New Delhi-110055.
http://books.google.com.eg/books?id=w60OAQAAMAAJ&q=Fundamental+of+plant+physiology&dq=Fundamentals+of+plant+physiology&hl=en&sa=X&ei=SG_pUtHqM8SJ7AbTrICYCA&ved=0CCoQ6AEwAA
- 2) **Verma, S.K and Mohit, V. 2008.** A text book of plant physiology, Biochemistry and biotechnology. S. chand & Company LTD. Ramnagar New Delhi-110055.
http://books.google.com.eg/books?id=GtL0UQR8QDYC&dq=A+text+book+of+plant+physiology&hl=en&sa=X&ei=Ym_pUuj8KbTA7AaJnYCgAw&ved=0CD8Q6AEwAw



Course Name: Mould fungi & Mycotoxins (Code: AB 0810)

Pre-requisite: (AB 0808)

Course Description

The course aims of monitoring the mycotoxin content in different food and feed products. To investigate Mould Fungi and study their growth pattern and potency to form mycotoxin. To determine ecological distribution of toxic fungi in relation to mycotoxins production. To investigate mycotoxin production in various storage system. Major Mycotoxin-Producing Fungi, Major Classes of Mycotoxins and Prevention, control and Regulation of mycotoxins.

Course Contents:

- 1) Introduction: Mycotoxins and human health risks, Mycotoxin economic aspects.
- 2) Fungal ecology and the occurrence of mycotoxins.
- 3) Temperature and Moisture Control in Storage, Effect of fungal infection and insect infestation interaction, moisture content and substrate on mycotoxin production.
- 4) Occurrence of Mycotoxins in Foods and Feeds.
- 5) Major Mycotoxin-Producing Fungi.
- 6) Major Genera of Mycotoxigenic Fungi.
- 7) Mycotoxin-Producing Fungi and their Control.
- 8) Major Classes of Mycotoxins' Aflatoxins, Trichothecenes, Zearalenone Ochratoxin A, Fumonisin, Patulin, Alimentary Toxic Aleukia Citrinin, Ergot Alkaloids, Rubratoxin, Penicillic acid, Tremorgens
- 9) Prevention, control and Regulation of mycotoxins, Agronomic practices to reduce Mycotoxins.

References:

- 1) **Dube HC. 2005.** An Introduction to Fungi. 3rd Ed. Vikas Publ. House, New Delhi.
http://books.google.com.eg/books?id=kJQ_AAAAYAAJ&q=An+Introduction+to+Fungi&dq=An+Introduction+to+Fungi&hl=en&sa=X&ei=jm_pUqTfCILy7Aal8oC4AQ&ved=0CDkQ6AEwAw



- 2) **De Vries, J.W., Trucksess, M.W. and Jackson, L.S. (Ed.), 2002.** Mycotoxins and Food safety. Kluwer Academic/Plenum Publications, New York, N.Y. 65 .
http://books.google.com.eg/books?id=Zg9mT9zu3IAC&printsec=frontcover&dq=Mycotoxins+and+Food+safety&hl=en&sa=X&ei=sW_pUtzwEMeN7Aa41IGgDQ&ved=0CCoQ6AEwAA#v=onepage&q=Mycotoxins%20and%20Food%20safety&f=false
- 3) **Proctor, R. H. 2000.** Fusarium toxins: trichothecenes and fumonisins, p. 363-381. In J. W. Cary, J. E. Linz, and D. Bhatnagar (ed.), Microbial food-borne diseases: mechanisms of pathogenesis and toxin synthesis. Technomic Publications, Lancaster, Pa. 207.
http://books.google.com.eg/books?id=jU5Wx8LkZHUC&printsec=frontcover&dq=Fusarium+toxins&hl=en&sa=X&ei=zW_pUq3CDuGv7AaBnYCwCg&ved=0CCoQ6AEwAA#v=onepage&q=Fusarium%20toxins&f=false

Course Name: Post-harvest diseases (Code AB 0811)

Prerequisite: (AB 0801-or AB 0803)

Course Description:

The course aims of acquainting the post-harvest diseases of agricultural produce and their ecofriendly management, concept of post-harvest diseases, definitions, importance with environment and health.

Course Contents:

- 1) Types of post-harvest problems both by biotic and abiotic causes.
- 2) Factors governing post-harvest problems both as biotic and abiotic, role of physical environment, agro-ecosystem leading to quiescent infection.
- 3) Operational mechanisms and cultural practices in perpetuation of pathogens, pathogens and antagonist and their relationship, role of biocontrol agents and chemicals in controlling post-harvest diseases.
- 4) Integrated approach in controlling diseases and improving the shelf life of produce with special reference to mycotoxicogenic fungi, knowledge of Codex Alimentarius.
- 5) Isolation characterization and maintenance of pathogens, role of different storage conditions on disease development.
- 6) Comparative efficacy of different chemicals, fungicides, phytoextracts and bioagents.



References:

- 1) **Agrios, G. N. 2005.** Plant pathology. 5th Ed. Academic Press, NY, USA.
http://books.google.com.eg/books?id=xLdSrKhThNEC&pg=PA2&dq=Plant+pathology&hl=en&sa=X&ei=G_pUuneJuuB7QaisYFo&ved=0CEcQ6AEwBQ#v=onepage&q=Plant%20pathology&f=false
- 2) **Alexopoulos, CJ, Mimms CW and Blackwell M. 1996.** Introductory Mycology. John Wiley & Sons, New York.
<http://books.google.com.eg/books?id=PVIupwAACAAJ&dq=Introductory+Mycology&hl=en&sa=X&ei=JHDpUuyFGImR7AaVroCAAQ&ved=0CCgQ6AEwAA>
- 3) **Kranz, J. 2002.** Comparative epidemiology of plant diseases. Springer press.
<http://books.google.com.eg/books?id=Z3HGFjWIA6UC&printsec=frontcover&dq=Comparative+epidemiology+of+plant+diseases&hl=en&sa=X&ei=Q3DpUt2bCsrH7AbQu4GgBA&ved=0CCoQ6AEwAA#v=onepage&q=Comparative%20epidemiology%20of%20plant%20diseases&f=false>

8.10. Courses of Agricultural Biochemistry Department (AC 09):

Course Name: Chemistry 1 (Organic and Inorganic) (Code: AC 0901).

Prerequisite: (CJ 1201).

Course Description:

The course aims at describing stereo-chemistry of aliphatic compounds and explaining organic reaction mechanisms. Determining conformation and configuration of organic compounds and reaction mechanisms are included. Electronic configuration, chemical bonds and concentrations are also given.

Course Contents:

- 1) Carbon atom and hybridization principals of reaction mechanisms.
- 2) Classification of organic compounds (Alkanes, Alkenes, Alkynes, Alcohols, Ethers, Aldehydes, ketones, Organic acids and its derivatives).
- 3) Electronic configuration of atoms.
- 4) Chemical bonds between atoms.
- 5) State of matter (gaseous, liquid and solid states).
- 6) Electronic theory of valency.
- 7) Laws of state of matter.



References:

- 1) **James House 2012.** Inorganic Chemistry. 2nd edition. Elsevier Inc. Oxford UK.
<http://books.google.com.eg/books?id=OVG0PwAACAAJ&dq=Inorganic+Chemistry&hl=en&sa=X&ei=d3DpUr3KDsWO7Ab8noGQBg&ved=0CCoQ6AEwAA>
- 2) **John McMurry 2012.** Organic Chemistry 8th edition. Cengage Learning China.
http://books.google.com.eg/books?id=kQgu2j_ber0C&printsec=frontcover&dq=Organic+Chemistry&hl=en&sa=X&ei=j3DpUv63Gq7Y7Aba34HoAw&ved=0CCoQ6AEwAA#v=onepage&q=Organic%20Chemistry&f=false

Course Name: Chemistry 2 (Biochemistry) (Code: AC 0902)

Prerequisite: (AC 0901)

Course Description:

The course covers the structure of the living cell and its functions, the structure and chemistry of its major components (carbohydrates, proteins, lipids and enzymes) and benefits of these compounds to living organisms, and Identifying the physical and chemical properties of base units of these groups and their classification.

Course Contents:

- 1) Carbohydrates and their classification and their reactions.
- 2) Proteins (amino acids, nucleic acids and their reactions).
- 3) Lipids (classification), conjugated lipids, derived lipids and their reactions.
- 4) Enzymes (classification, mechanisms, kinetics, inhibitions).

References:

- 1) **Mary K. Campbell and Shawn O. Farrell 2010.** Biochemistry. 7th Ed. Cengage Learning, China.
http://books.google.com.eg/books?id=J5NVrE_Uf-8C&printsec=frontcover&dq=Biochemistry&hl=en&sa=X&ei=rXDpUt3NJYS07QbIqYCoDQ&ved=0CCoQ6AEwAA#v=onepage&q=Biochemistry&f=false



- 2) **Reginald H. Garrett and Charles M. Grisham** 2013. Biochemistry, 5th Ed. Cengage Learning China. <http://books.google.com.eg/books?id=-Lhp0ppRYWoC&printsec=frontcover&dq=Biochemistry&hl=en&sa=X&ei=rXDpUt3NJYS07QbIqYCoDQ&ved=0CDYQ6AEwAg#v=onepage&q=Biochemistry&f=false>

Course Name: Chemistry 3 (Analytical) (Code: AC 0903). Prerequisite: (AC 0901).

Course Description:

Providing knowledge on chemical composition of substances important for life, understanding and calculating chemical weights (e.g. equivalent, molecular), detecting end points of titrations, preparing standard and buffer solutions and oxidation-reduction reactions and their equilibrium constants.

Course Contents:

- 1) Concentration, volumetric analysis (acidimetry and alkalimetry, oxidation and reduction, precipitation reactions).
- 2) Equilibrium and law of mass action, hydrogen ion concentration and pH, buffer solutions, and titration curves.
- 3) Spectrum analysis (spectrophotometry, ultraviolet, and flame photometry).
- 4) chromatography analysis (paper, thin-layer, liquid, and gas-liquid)
- 5) Gas Chromatography-Mass spectroscopy 'G.C-Mass', Gel-electrophoresis, and amino-acid analysis.

References:

- 1) **David Kealey and Haines P. J.** 2002. BIOS Instant Notes in Analytical Chemistry. Garland Science – BIOS Scientific publishers Ltd Oxford UK. <http://books.google.com.eg/books?id=Z-YKjSfF4oIC&printsec=frontcover&dq=BIOS+Instant+Notes+in+Analytical+Chemistry&hl=en&sa=X&ei=5XDpUtGmKofT7Aav7YGYDw&ved=0CCoQ6AEwAA#v=onepage&q=BIOS%20Instant%20Notes%20in%20Analytical%20Chemistry&f=false>
- 2) **David G.L.** 2001. Analytical Chemistry. Universities Press India. http://books.google.com.eg/books?id=Ou7vAAAAMAAJ&q=Analytical+Chemistry&dq=Analytical+Chemistry&hl=en&sa=X&ei=3DpUvLPCoPR7Aan_4DAAw&ved=0CDQQ6AEwAg



Course Name: Chemistry 4 (Recycling) (Code: AC 0904)

Prerequisite: (AC 0901 or AC 0902)

Course Description:

Viewing of the environment and its components. Surveying chemical pollutants, wastes and their structure and behavior. Studying methods of their analysis and detection in the environment and method and techniques of their recycling.

Course Contents:

- 1) Environmental wastes, chemical structure of their major components.
- 2) Bioconversion of environmental wastes to produce useful safe materials.
- 3) Chemical and technological methods for maximization benefits of environment wastes.

References:

- 1) **ChongrakPolprasert 2007.** Organic Waste Recycling: Technology and Management 3rd edition. IWA Publishing London UK.
<http://books.google.com.eg/books?id=owycqJMjoZoC&printsec=frontcover&dq=Organic+Waste+Recycling&hl=en&sa=X&ei=IXHpUrX0K5LY7AbviIGwCA&ved=0CDMQ6AEwAA#v=onepage&q=Organic%20Waste%20Recycling&f=false>
- 2) **Sally Morgan 2009.** Waste, Recycling and Reuse. Evans Brothers London UK.
<http://books.google.com.eg/books?id=M64YV5SgOm4C&printsec=frontcover&dq=Waste,+Recycling+and+Reuse&hl=en&sa=X&ei=RHHpUsrzJcad7QaCt4DQBA&ved=0CDgQ6AEwAA#v=onepage&q=Waste%2C%20Recycling%20and%20Reuse&f=false>

Course Name: Chemistry 5 (Instrumental) (Code: AC 0905).

Prerequisite: (AC 0903).

Course Description:

Providing knowledge on techniques of chemical analysis. Identifying the principles and procedures of chromatography and spectroscopy analyses.



Course contents:

- 1) Instrument of spectrum analysis (spectrophotometry, ultraviolet analysis, and flame photometry).
- 2) Instruments of chromatography analysis (paper chromatography 'PC', thin-layer chromatography 'TLC', high performance liquid chromatography 'HPLC', and gas-liquid chromatography 'GLC').
- 3) Gas Chromatography-Mass spectroscopy 'G.C-Mass', Gel-electrophoresis, and amino-acid analysis.
- 4) Instruments of atomic absorption and atomic-emission.

References:

- 1) **Sharma B. K. 2000.** Instrumental Methods of Chemical Analysis. GOEL publishing House-Krishna Prakashan Media India. http://books.google.com.eg/books?id=igR_jsqfcowC&printsec=frontcover&dq=Instrumental+Methods+of+Chemical+Analysis&hl=en&sa=X&ei=Y3HpUsn7E8G47AbzgYH4DQ&ved=0CDMQ6AEwAA#v=onepage&q=Instrumental%20Methods%20of%20Chemical%20Analysis&f=false
- 2) **Francis Rouessac and Annick Rouessac, 2013.** Chemical Analysis Modern Instrumentation Methods and Techniques 2nd edition. Wiley England. <http://books.google.com.eg/books?id=4XmjFLkJGygC&printsec=frontcover&dq=Chemical+Analysis&hl=en&sa=X&ei=enHpUtDbI-TW7Qaph4HYCA&ved=0CEUQ6AEwAg#v=onepage&q=Chemical%20Analysis&f=false>

Course Name: Pollutants and toxicants Chemistry (Code: AC 0907).

Prerequisite: AC0902, AB 0808

Course Description:

Providing knowledge on chemical structure and performed complexes of pollutants and toxicants. Identifying the principles of the toxic effect of those components on human health and environment as well as the performed complexes on human body. Illustrating the mechanisms belongs to reduction and detoxification of those harmful components.

Contents:

- 1) Introduction about the potential pollutants and antioxidants.



- 2) The chemical principles about the natural pollutants and toxicants.
- 3) The potential toxicants such as natural and synthetics.
- 4) The pollutants such as pesticides residues
- 5) The heavy metal and occurrence in food products.
- 6) The natural toxicants occurrence in food products.
- 7) The relation of pollutants and toxicants chemistry with the food safety issue.
- 8) The procedures to reduce the occurrence of pollutants and toxicants chemistry in food chains.

References:

- 1) **Sharma B. K. 2000.** Instrumental Methods of Chemical Analysis. GOEL publishing House-Krishna Prakashan Media India.
http://books.google.com.eg/books?id=igR_jsqfcowC&printsec=frontcover&dq=Instrumental+Methods+of+Chemical+Analysis&hl=en&sa=X&ei=n3HpUujHEKrA7Ab10oDYCQ&ved=0CDMQ6AEwAA#v=onepage&q=Instrumental%20Methods%20of%20Chemical%20Analysis&f=false
- 2) **Francis Rouessac and Annick Rouessac, 2013. Chemical Analysis: Modern Instrumentation Methods and Techniques 2nd edition. Wiley England.**
<http://books.google.com.eg/books?id=4XmjFLkJGygC&printsec=frontcover&dq=Chemical+Analysis&hl=en&sa=X&ei=tHHpUq53h43tBq-NgYAN&ved=0CEUQ6AEwAg#v=onepage&q=Chemical%20Analysis&f=false>

8.11. Courses of Genetics Department (GE 10):

Course Name: Genetics 1 (Fundamentals) (Code: GE 1001).

Prerequisite:

Course Description:

The course gives the student the principles of the science of genetics. An overview of genetics starting from the Mendel time up to date. The different of genetics, the classical, molecular, and evolutionary are given.



Course Contents:

- 1) Introduction and historical overview.
- 2) Mendelism and the chromosome theory.
- 3) Extension of Mendelism.
- 4) Linkage and Crossing-over.
- 5) Allelic variation and gene function.
- 6) Non-Mendelian inheritance and cytoplasmic factors.
- 7) Pedigree analysis.
- 8) Chromosomal variations.

References:

- 1) **Brooker, R.J. 1999.** Genetics: Analysis and principles. McGraw Hill NY.USA.
<http://books.google.com.eg/books?id=I6jwygAACAAJ&dq=Genetics:+An+analysis+and+principles&hl=en&sa=X&ei=1HHpUu2HHquB7QbpzYHoBQ&ved=0CCoQ6AEwAA>
- 2) **Tamarin, R.H. and Leavitt, R.W. 1991.** W.C. Brown Publ. Co. Madison, WI, USA.
<http://books.google.com.eg/books?id=yTWa1apOh0gC&printsec=frontcover&dq=genetics&hl=en&sa=X&ei=G3LpUu72D7Sy7AaBtYG4DQ&sqi=2&ved=0CC4Q6AEwAQ#v=onepage&q=genetics&f=false>

Course Name: Genetically Modified Food (Code: GE 1007)

Prerequisite: (GE 1001)

Course Description:

The course aims at teaching students genetic modification of food and edible organisms. Methods of genetic modification, plant and animal are given. Ethics and controversies over genetic modification, molecular engineering, and genetic engineering problems are given.

Course Content

- 1) Genetic modification – terminology, methods of genetic modification, genetic modification of bacteria, plant & animal, controversies over genetic modification, policy around the world (Egypt).



- 2) Genetic modification in Agriculture – transgenic plants, genetically modified foods, application, future applications, and ecological impact of transgenic plants.
- 3) Genetically modified foods – organic foods, types of organic foods, identifying organic foods, organic food & preservatives.
- 4) Genetic modification in Food industry –background, history, controversies over risks, application, future applications.
- 5) Genetic modification in Medicine-gene therapy, types of gene therapy, vectors in gene therapy, molecular engineering, human genetic engineering, problems & ethics.

References:

- 1) **Lilliston, B. and Cummins, R. 2004.** Genetically engineered food: A self-defense guide for consumers. Marlowe & Co., London, UK.
<http://books.google.com.eg/books?id=FKwzwOdJR3IC&printsec=frontcover&dq=Genetically+engineered+food&hl=en&sa=X&ei=PHLpUs2tKuvX7Abv-oCwDA&ved=0CDsQ6AEwAQ>
- 2) **Pence, G.E. 2002.** Designer foods: Mutant harvest or bread basket of the world? Rowman& Littlefield Publ. Inc. Lanham, MD, USA.
<http://books.google.com.eg/books?id=QsTsXW9vJKEC&printsec=frontcover&dq=Designer+foods&hl=en&sa=X&ei=YHLpUrqoFuKy7Ab34IDIBQ&ved=0CC8Q6AEwAQ#v=onepage&q=Designer%20foods&f=false>

Course Name: Genetics 2 (Cytology and Cytogenetics) (Code: GE 1002)

Pre-requisite: GE 1001

Course Description:

The course aims at teaching students cytoplasmic factors, inheritance, and extra-nuclear inheritance (mitochondrial, chloroplast). Non-chromosomal inheritance, maternal inheritance, and uni-parental inheritance are also viewed.

Course Content

- 1) Introduction to cytology and cytogenetics.
- 2) Evidence for cytoplasmic factors.
- 3) Inheritance: cytoplasmic and extra-nuclear (mitochondrial, chloroplast).



- 4) Inheritance: non-chromosomal, maternal, uni-parental.
- 5) Euploidy, non-disjunction and aneuploidy, and aneuploid segregation.
- 6) Aneuploidy in human and polyploidy in plants and animals.
- 7) Induced polyploidy: applications, chromosomal mosaics, polygene chromosome in diptera.
- 8) Deletion, duplication, inversion and translocation.
- 9) Position effect: centromeric and non-centromeric breaks in chromosomes.
- 10) Chromosomal rearrangements in humans and cytological mapping.
- 11) Chromosomal aberrations and evolution

References:

1. **Graf, U., VanSchaik, N. and Wurgler, F.E. 1992.** Cytology and cytogenetics. In “Drosophila genetics Graf, U *et al.* eds” Springer-Verlag, Heidelberg, Germany.
<http://books.google.com.eg/books?id=CNUPuAAACAAJ&dq=Cytology+and+cytogenetics&hl=en&sa=X&ei=oHLpUrSADe7H7AaDkoEQ&ved=0CDoQ6AEwAQ>

Course Name: Molecular Biology (Code: GE 1004)

Prerequisite: (AB 0801)

Course Description:

Molecular biology deals with nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development. It is a large and ever-changing discipline. The course gives the student information on the molecular mechanisms of DNA replication, repair, transcription, protein synthesis, and gene regulation in different organisms.

Course Content

- 1) Introduction.
- 2) Mechanisms of DNA replication, repair, transcription, protein synthesis.
- 3) Gene regulation in different organisms.
- 4) Techniques and experiments discern molecular mechanisms.
- 5) In-depth look at some rapidly evolving fields such as chromatin structure and function, and RNA polymerase dynamics.



- 6) Regulation of gene expression by different types of RNAs.

References:

- 1) **Rapley, R., and Walker, J.M. 2000.** Molecular biology and biotechnology. 4th Ed., Royal Soc. of Chemistry, London, UK.
- 2) http://books.google.com.eg/books?id=KRU_fy3J8u4C&printsec=frontcover&dq=Molecular+biology+and+biotechnology&hl=en&sa=X&ei=wHLpUpHSIsWN7Ab_w4DQCw&ved=0CCoQ6AEwAA#v=onepage&q=Molecular%20biology%20and%20biotechnology&f=false

8.12. Courses of Agricultural Engineering Department (AE 11):

Course Name: Agricultural Engineering (Fundamentals) Code: AE 1101

Pre-requisite:

Course Description:

This course provides the students with the application of engineering principles to problems in soil and water conservation, agricultural power units, machinery, agricultural electricity, structures, and animal environments. Material handling and processing of agricultural products will also be covered.

Course Content

- 1) Dimensions and units (SI units and other systems of units).
- 2) Irrigation and drainage basics.
- 3) Basic information of hydraulics, water Sources – canals and drains net in Egypt – importance of drainage.
- 4) Types of drains and compare between drains – planning and Design of network drains.
- 5) Farm machinery and tractors science.
- 6) Introduction to mechanic fundamental-tractor types-and farm machinery types and performance.
- 7) Bio-systems engineering basics.
- 8) Environmental Control.
- 9) Wastes Recycle (Compost – Silage – Biogas).
- 10) Aqua cultural Engineering.
- 11) Food process engineering.



- 12) The basic of food rheology and engineering properties.
- 13) Thermodynamics and heat transfer basic and its relationship with food processing.
- 14) Farm building and environmental control basic knowledge.

References:

- 1) **Yadav, S.N. 2011.** Agricultural Engineering: Fundamentals and applications. Biotech Books, Vedamb Books Ltd. New Delhi, India.
http://books.google.com.eg/books?id=E1JYAAAAMAAJ&q=Agricultural+Engineering&dq=Agricultural+Engineering&hl=en&sa=X&ei=IHPpUtClC_ojY7AbI6IH0CA&ved=0CDEQ6AEwAQ
- 2) **Bello, S.R. 2012.** Agricultural engineering: Principles and practice .Create Space Independent Publ. Platform. Amazon, London, UK.
http://books.google.com.eg/books?id=uJvu_qnUKFsC&pg=PA64&dq=Agricultural+engineering:+Principles+and+practice&hl=en&sa=X&ei=OXPPUqzxPOiJ7AaA2YD4Cw&ved=0CDsQ6AEwAw#v=onepage&q=Agricultural%20engineering%3A%20Principles%20and%20practice&f=false

Course Name: Biomathematics (Code: AE 1102)

Pre-requisite: (CJ 1201)

Course Description:

This course focuses on the use of basic theories of mathematics in the biological science. It provides the student with knowledge about functions, curves, limits, curve fitting, differentiation, differential calculus, differential equations, mathematical series, matrix algebra and integration. Also, how to apply these topics in the biological science such as plant growth analysis, micro-organism development, the spread of diseases, population dynamics, and environmental data analysis

Course Content

- 1) Linear Algebra: Matrices and Determinants.
- 2) Calculus: Derivatives, integration, applications; partial derivatives; Fourier series.



- 3) Differential Equations: Linear and non-linear first order ‘Ordinary Differential Equations (ODEs); Higher order linear ODEs with constant coefficients; Cauchy’s and Euler’s equations; Laplace transforms; Partial Differential Equations (PDEs)-Laplace, heat and wave equations.
- 4) Numerical Methods: Solutions of linear and non-linear algebraic equations; integration of trapezoidal and Simpson’s rule; single and multi-step methods for differential equations.

References:

- 1) **Mangel, M. 2006.** The theoretical biologist's toolbox. Quantitative methods for ecology and evolutionary biology, Cambridge Univ. Press, Academic and Professional Books. London, UK.
http://books.google.com.eg/books?id=_RW8upYq1iUC&printsec=frontcover&dq=The+theoretical+biologist%27s+toolbox&hl=en&sa=X&ei=WnPpUu7kEebD7AaYiYCgDA&ved=0CCoQ6AEwAA
- 2) **Yeagers, E.K., Herod J. V., and Shonkweilerr, R.W. 1996.** An introduction to the mathematics of biology. Birkhäuser Publ., Boston, MA, USA
<http://books.google.com.eg/books?id=3j0gu63QWmQC&printsec=frontcover&dq=introduction+to+the+mathematics+of+biology&hl=en&sa=X&ei=dXPpUqy7OYTn7AampIHYAg&ved=0CDEQ6AEwAQ#v=onepage&q=introduction%20to%20the%20mathematics%20of%20biology&f=false>

Course Name: Agricultural Bio-systems engineering (Code: AE 1104)

Pre-requisite: (AE 1102)

Course Description:

Bio-systems engineering is a field of engineering which integrates engineering science and design with applied biological, environmental and agricultural sciences. Students will be able to understand remote sensing techniques, precision agricultural, biosensors, renewable energy application in agricultural projects and developing and manufacturing products derived from biological materials



Course Content

- 1) Introduction.
- 2) Remote sensing.
- 3) Geographical positioning system.
- 4) Geographical information system.
- 5) Precision agricultural.
- 6) Biosensors.
- 7) Solar and geothermal energies for food driers and for heating farm buildings and green houses.
- 8) Compost machinery and production.
- 9) Compost tea and biogas production.

References:

- 1) **Nag, A. 2009.** Biosystems Engineering. McGraw-Hill, NY, USA.
<http://books.google.com.eg/books?id=TMhreJSpuU8C&printsec=frontcover&dq=Biosystems+Engineering&hl=en&sa=X&ei=kXPpUoXhOojT7Aaih4CYCw&ved=0CCoQ6AEwAA#v=onepage&q=Biosystems%20Engineering&f=false>
- 2) **Krull, R. and Wittmann. C. 2010.** Biosystem engineering II: Linking cellular networks and bioprocesses. Springer, NY, USA.
http://books.google.com.eg/books?id=TMhreJSpuU8C&printsec=frontcover&dq=Biosystem+engineering+II&hl=en&sa=X&ei=sXPpUoW_BOvQ7AbEkoGgAw&ved=0CCoQ6AEwAA#v=onepage&q=Biosystem%20engineering%20II&f=false

Course Name: Food Engineering (Code: AE 1106)

Pre-requisite: (AE 1101)

Course Description:

The purpose of this course is to provide students with the concepts and principles of engineering along with their applications to food processing. It is designed to cover fundamental principles of heat and mass transfer, thermodynamics, food rheology, fluid mechanics, and moisture and energy



balances. Special emphasis will be made on the development of students' ability to quantitatively evaluate processing parameters and efficacy.

Course Content

- 1) Material Balances, thermodynamics and Perfect Gas Law, Energy Balances Fluid Mechanics. Friction loss in pipes, fittings and valves. Heat transfer, steady state heat transfer. Unsteady-state heat transfer; prediction of product temperature during heating and cooling in containers.
- 2) Thermal processing, Thermal processing concepts; kinetic parameters, influence of temperature on inactivation of microbial populations.
- 3) Mass transfer, Introduction to mass transfer; steady-state diffusion in solids Convective mass transfer. Mass transfer; unsteady-state diffusion in solids, typical applications in foods.
- 4) Separation processes, Concentration of liquid foods; Membrane separation systems; reverse osmosis and ultra filtration applications, system design.
- 5) Food dehydration; system description, prediction of drying times. Extrusion processes for food products; types of extruders and description of extrusion operations.
- 6) Extrusion system design; factors influencing extruder Operations, demonstration.

References:

- 1) **Singh R Paul ,Dennis R Heldman2014.** Introduction to Food Engineering (Food Science and Technology). Academic Press.
http://books.google.com.eg/books?id=jlS3R6yxa-AC&printsec=frontcover&dq=Introduction+to+Food+Engineering&hl=en&sa=X&ei=0HPpUvW_Cu2u7AaWu4D4BA&ved=0CCoQ6AEwAA#v=onepage&q=Introduction%20to%20Food%20Engineering&f=false
- 2) **Zeki Berk2009.** Food Process Engineering and Technology. Academic Press.
<http://books.google.com.eg/books?id=vP1B3SRE824C&pg=PR21&dq=Food+Process+Engineering+and+Technology&hl=en&sa=X&ei=7nPPuUD9C-Pe7AbfkIHgBg&ved=0CCoQ6AEwAA>



Course Name: Post-harvest Engineering (Code: AE 1107)

Pre-requisite: (AE 1104)

Course Description:

It is designed to provide a conceptual awareness of the engineering aspects of postharvest technology. It gives the knowledge about the factors affecting the quality of the agricultural product after harvesting. It studies the engineering properties of the products that related to the handling and storage operations. It deals with the techniques of the cleaning, sorting, grading, packaging, transporting and storing operations.

Course Content:

- 1) The engineering properties of the agricultural products (physical, mechanical, thermal and aerodynamic).
- 2) Handling methods and transporting fresh produce (belts, screws, forklift, crane, etc).
- 3) Pre-cooling of fruits and vegetables.
- 4) Cleaning, sorting and grading techniques.
- 5) Packaging, packages types, design and evaluation.
- 6) Storage, methods, and the principals and factors affecting the products during storage.

References:

- 1) **Joshi, V.K. Verma L.R. 2002.** Postharvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation and Waste Management. Indus Publishing Company (November 2002).
[http://books.google.com.eg/books?id=nzvDi9qSEKkC&pg=PA94&dq=Post harvest+Technology+of+Fruits+and+Vegetables&hl=en&sa=X&ei=BXTpUsSDOqWu7AbgkoHwCg&ved=0CCoQ6AEwAA](http://books.google.com.eg/books?id=nzvDi9qSEKkC&pg=PA94&dq=Post+harvest+Technology+of+Fruits+and+Vegetables&hl=en&sa=X&ei=BXTpUsSDOqWu7AbgkoHwCg&ved=0CCoQ6AEwAA)
- 2) **Wojciech J. Florkowski, Stanley E. Prussia, Robert L. Shewfelt, Bernhard Brueckner 2009.** Postharvest Handling: A Systems Approach. Academic Press.
<http://books.google.com.eg/books?id=euakAoRNZEC&printsec=frontcover&dq=Postharvest+Handling&hl=en&sa=X&ei=GXTpUofdLqHA7Abir4GQBg&ved=0CCoQ6AEwAA>



Appendix 1. Courses List of Food safety Program

Level 1 First semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
AB 0801	Botany	3	2	2	
AC 0901	Chemistry 1 (Inorganic and Organic)	3	2	2	
PP 0401	Zoology	3	2	2	
AG 0101	Agronomy 1 (Fundamentals)	3	2	2	
AE 1102	Bio-mathematics	3	2	2	
CJ 1201	English 1	2	2	0	
Optional Courses (Selective)					
AE 1101	Agricultural Engineering (Fundamentals)	3	2	2	
SO 0502	Bio-Physics	3	2	2	
CJ 1203	Computer Science	3	2	2	
The student registers all compulsory courses plus one optional course of his/her choice in each semester.					
Department Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy (AG)-Horticulture (HO)-Agricultural Engineering (AE)-Economics(EA)-Food Science (FS)-Genetics (GE)-Agric. Botany (AB)-Common/Joint (CJ)}					



Appendix 1. (Continued)

Level 1 Second semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
AB 0803	Agricultural Microbiology	3	2	2	AB 0801
GE 1001	Genetics 1 (Fundamentals)	3	2	2	
HO 0201	Horticulture 1 (Fundamentals)	3	2	2	AB 0801
AP 0301	Animal Production 1 (Physiology)	3	2	2	
CJ 1206	Human Rights and Agricultural Legislation	-	2	0	CJ 1201
Optional Courses (Selective)					
AE 1106	Food Engineering	3	2	2	AE 1101
AG 0102	Agronomy 2 (Seeds and Weeds)	3	2	2	AB 0501
SO 0504	Bio-organo Fertilization	3	2	2	SO 0501
CJ 1205	Biosafety	3	2	2	CJ 1201
PP 0409	New Approaches in Pest Control	3	2	2	PP 0401
GE 1004	Molecular Biology	3	2	2	AB 0801 GE 1001
The student registers all compulsory courses plus two optional courses of his/her choice in each semester.					
Department	Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture(HO)-Agricultural Engineering(AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)}				



Appendix 1. (Continued)

Level 2 First semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
AC 0902	Chemistry 2 (Biochemistry)	3	2	2	AC 0901
AP 0302	Animal Production 2 (Dairy and Meat)	3	2	2	AP 0301
SO 0501	Soil & Water Science	3	2	2	AC 0901
FS 0701	Food and Dairy Science (Fundamentals)	3	2	2	AB 0801
PP 0402	Entomology (General)	3	2	2	PP 0401
CJ 1202	English 2	2	2	0	CJ 1201
Optional Courses (Selective)					
AC 0904	Chemistry 4 (Recycling)	3	2	2	AC 0901
AE 1104	Agricultural Bio-Systems Engineering	3	2	2	AE 1102
AB 0805	Applied Microbiology	3	2	2	AB 0803
The student registers all compulsory courses plus one optional course of his/her choice in each semester.					
Department	Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture(HO)-Agricultural Engineering(AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)				



Appendix 1. (Continued)

Level 2 Second semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
EE 0602	Agricultural Economics (Fundamentals)	3	2	2	CJ 1202
AB 0808	Plant Physiology & Pathology	3	2	2	AB 0801
AP 0303	Animal Production 3 (Poultry)	3	2	2	AP 0301
PP 0403	Economic Entomology	3	2	2	PP 0402
CJ 1207	Effective Communication Skills	-	2	0	CJ 1202
Optional Courses (Selective)					
FS 0702	Food Toxicology	3	2	2	FS 0701
GE 1002	Genetics 2 (Cytology and Cytogenetic)	3	2	2	GE 1001
FS 0707	Food Technology 1 (Sugar and Confectionary)	3	2	2	FS 0701
FS 0712	Unit Operations in Food Processing	3	2	2	FS 0701
FS 0715	Food Legislation	3	2	2	FS 0701
AC 0907	Pollutants and toxicants Chemistry	3	2	2	AC0902 AB 0808
<p>The student registers all compulsory courses plus two optional courses of his/her choice in each semester.</p> <p>Department Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture(HO)-Agricultural Engineering(AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)</p>					



Appendix 1. (Continued)

Level 3 First semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
AC 0903	Chemistry 3 (Analytical)	3	2	2	AC 0901
HO 0202	Horticulture 2 (Vegetable Production)	3	2	2	HO 0201
FS 0703	Dairy Technology 1 (Liquid Milk and its Treatments)	3	2	2	FS 0701
FS 0706	Food and Dairy Chemistry	3	2	2	FS 0701
Optional Courses (Selective)					
FS 0704	Dairy Technology 2 (Cheese Technology)	3	2	2	FS 0701
EE 0605	Technology Transfer and Diffusion	3	2	2	EE 0602
FS 0708	Food Technology 2 (Cereals and Oils)	3	2	2	FS 0701
AP 0304	Animal Production 4 (Fish)	3	2	2	AP 0301
FS 0710	Risk Assessment and Quality Control	3	2	2	FS 0701
AC 0905	Chemistry 5 (Instrumental)	3	2	2	AC0903
The student registers all compulsory courses plus two optional courses of his/her choice in each semester.					
Department	Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture(HO)-Agricultural Engineering(AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)				



Appendix 1. (Continued)

Level 3 Second semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
HO 0203	Horticulture 3 (Fruit Production)	3	2	2	HO 0201
AG 0104	Biostatistics & Experimental Design	3	2	2	AE 1102
AG 0103	Agronomy 3 (Crop Production)	3	2	2	AG 0103
FS 0711	Food and Dairy Microbiology	3	2	2	FS 0706
Optional Courses (Selective)					
HO 0204	Horticulture 4 (Ornamental Medicinal and Aromatic Plants)	3	2	2	HO 0201
FS 0709	Food Technology 3 (Meat, Fish and Poultry)	3	2	2	FS 0701
FS 0705	Dairy Technology 3 (Fermented Milks and By-Products)	3	2	2	FS 0701
HO 0206	Horticulture 6 (Post harvest Technology)	3	2	2	HO 0201
AE 1107	Post-harvest Engineering	3	2	2	AE 1104
FS 0724	Food additives	3	2	2	FS 0711
The student registers all compulsory courses plus two optional courses of his/her choice in each semester.					
Department	Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture(HO)-Agricultural Engineering(AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)				



Appendix1. (Continued)

Level 4 First semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
FS 0713	Food Preservation	3	2	2	AE 1101
AP 0308	Animal and Poultry Hygiene	3	2	2	AP 0301
AB 0810	Mould Fungi & Mycotoxins	3	2	2	AB 0808
CJ 1208	Graduation Project*	3	2	2	
Optional Courses (Selective)					
GE 1007	Genetically Modified Food	3	2	2	GE 1001
FS 0716	Functional Dairy Products	3	2	2	FS 0701
FS 0717	Milk Fatty Products and Milk Replacement	3	2	2	FS 0706 & FS 0711
FS 0718	Food Packaging Technology	3	2	2	FS 0706 & FS 0711
EE 0623	Agricultural Marketing	3	2	2	EE 0602
FS 0720	Food safety Insurance	3	2	2	FS 0706 FS 0713
<p>The student registers all compulsory courses plus two optional courses of his/her choice in each semester.</p> <p>Department Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture (HO)-Agricultural Engineering(AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)}</p>					

*Extended through entire year & examination at the end of the 2nd semester.



Appendix 1. (Continued)

Level 4 Second semester: Food Safety Program					
Compulsory Courses (Obligatory)					
Course Code	Course Name	Unit	Theoretical	Practical	Pre-requisite
FS 0714	Human Nutrition and Nourishment	3	2	2	FS 0706
PP 0408	Pesticides Residues	3	2	2	PP 0401 or AC 0901
FS 0719	Food and Dairy Sanitation & Quality Control	3	2	2	FS 0706 FS 0713
FS 0723	Computer Applications in Food safety	3	2	2	CJ 1203
CJ 1208	Graduation Project*	3	2	2	
Optional Courses (Selective)					
FS 0721	Condensed & Dried Milks and Ices	3	2	2	FS 0706 or FS 0713
FS 0722	Food Nano-technology	3	2	2	FS 0701
FS 0725	Industrial Fermentation	3	2	2	FS 0711
The student registers all compulsory courses plus two optional courses of his/her choice in each semester.					
Department	Codes: {Soils(SO)-Agric. Chemistry(AC)-Animal Production(AP)-Plant Protection(PP)-Agronomy(AG)-Horticulture(HO)-Agricultural Engineering (AE)-Economics(EE)-Food Science(FS)-Genetics (GE)-Agric. Botany(AB)-Common/Joint(CJ)				

*Extended through entire year & examination at the end of the 2nd semester.



Appendix 2.

Detailed List of Courses of the Food Safety Program:

1. Common and joint courses (CJ 12):

Course	Code	Food safety Program
English 1	CJ 1201	1/1 c
English 2	CJ 1202	2/1 c
Computer Science	CJ 1203	1/1 s
Biosafety	CJ 1205	1/2 s
Human Rights and Agricultural Legislation	CJ 1206	1/2 c
Effective Communication Skills	CJ 1207	2/2 c
Graduation Project	CJ 1208	4/2 c

{Level/semester, Compulsory Courses ‘c’ or selective ‘s’}.

2. Courses given by the Agronomy Department (AG 01):

Course	Code	Food safety Program
Agronomy 1 (Fundamentals)	AG 0101	1/1 c
Agronomy 2 (Seeds &weeds)	AG 0102	1/2 s
Agronomy 3 (Crop Production)	AG 0103	3/2 c
Biostatistics & Experimental Design	AG 0104	3/2 c

{Level/semester, Compulsory Courses ‘c’ or selective‘s’}.



Appendix 2



3. Courses given by the Horticulture Department (HO 02):

Course	Code	Food safety
Horticulture 1 (Fundamentals)	HO 0201	1/2 c
Horticulture 2 (Vegetable Production)	HO 0202	3/1 c
Horticulture 3 (Fruit Production)	HO 0203	3/2 c
Horticulture 4 (Ornamental, Medicinal & Aromatic plants)	HO 0204	3/2 s
Horticulture 6 (Post-harvest Technology)	HO 0206	3/2 s

{Level/semester, Compulsory Courses 'c' or selective 's'}.

4. Courses given by the Animal Production Department (AP 03):

Course	Code	Food safety
Animal Production 1 (Physiology)	AP 0301	1/2 c
Animal Production 2 (Dairy and Meat)	AP 0302	2/1 c
Animal Production 3 (Poultry)	AP 0303	2/2c
Animal Production 4 (Fish)	AP 0304	3/1 s
Animal & Poultry Hygiene	AP 0308	4/1 c

{Level/semester, Compulsory Courses 'c' or selective 's'}.



5. Courses given by the Plant Protection Department (PP 04):

Course	Code	Food safety
Zoology	PP 0401	1/1 c
Entomology (General)	PP 0402	2/2 c
Pesticide Residues	PP 0408	4/2 c
New Approaches in Pest-control	PP 0409	1/2 s
Economic Entomology	PP 0403	1/2 c

{Level/semester, Compulsory Courses ‘c’ or selective’s’}.

6. Courses given by the Soils Department (SO 05):

Course	Code	Food safety
Soils and Water Science	SO 0501	2/1 c
Biophysics	SO 0502	1/1 s
Bio-organo Fertilization	SO 0504	1/2 s

{Level/semester, Compulsory Courses ‘c’ or elective’s’}

7. Courses given by the Agricultural Economics & Extension Department (EE 06):

Course	Code	Food safety
Agricultural Economics (Fundamentals)	EE 0602	2/2 c
Technology Transfer & Diffusion	EE 0605	3/1 s
Agricultural Marketing	EE 0623	4/1 s

{Level/semester, Compulsory Courses ‘c’ or selective’s’}.



8. Courses given by the Food Science Department (FS 07):

Course	Code	Food safety
Food & Dairy Science (Fundamentals)	FS 0701	2/1 c
Food toxicology	FS 0702	2/2 s
Dairy Technology 1 (Liquid Milk and its Treatments)	FS 0703	3/1 c
Dairy technology 2 (Cheese Technology)	FS 0704	3/1 s
Dairy technology 3 (Fermented Milk and By-Products)	FS 0705	3/2 s
Food and Dairy chemistry	FS 0706	3/1 c
Food Technology 1 (Sugar and Confectionary)	FS 0707	2/2 s
Food Technology 2 (Cereals and Oils)	FS 0708	3/1 s
Food Technology 3 (Meat, Fish and Poultry)	FS 0709	3/2 s
Risk Assessment and Quality control	FS 0710	3/1 s
Food and Dairy Microbiology	FS 0711	3/2 c
Unit Operations in Food Processing	FS 0712	2/2 s
Food Preservation	FS 0713	4/1 c
Human Nutrition and Nourishment	FS 0714	4/2 c
Food Legislation	FS 0715	2/2 s
Functional Dairy Products.	FS 0716	4/1 s
Milk Fatty Products and Milk Replacements	FS 0717	4/1 s
Food Packaging Technology	FS 0718	4/1 s
Food and Dairy Sanitation & Quality Control	FS 0719	4/2 c
Food safety Insurance	FS 0720	4/1s
Condensed & Dried Milk and Ices	FS 0721	4/2 s
Food Nano-technology	FS 0722	4/2 s
Computer Applications in Food safety	FS 0723	4/2 c
Food additives	FS 0724	3/2 s
Industrial fermentation	FS 0725	4/2 s

{Level/semester, Compulsory Courses ‘c’ or selective’s’}.



9. Courses given by the Agricultural Botany Department (AB 08):

Course	Code	Food safety
Botany	AB 0801	1/1 c
Agricultural Microbiology	AB 0803	1/2 c
Applied Microbiology	AB 0805	2/1 s
Plant Physiology & Pathology	AB 0809	2/2 c
Mould, Fungi & Mycotoxins	AB 0810	4/1 c

{Level/semester, Compulsory Courses ‘c’ or selective ‘s’}.

10. Courses given by the Agricultural Biochemistry Department (AC 09):

Course	Code	Food safety
Chemistry 1 (Organic and inorganic)	AC 0901	1/1 c
Chemistry 2 (Biochemistry)	AC 0902	2/1 c
Chemistry 3 (Analytical)	AC 0903	3/1 c
Chemistry 4 (Recycling)	AC 0904	2/1 s
Chemistry 5 (instrumental)	AC 0905	3/1 s
Pollutants and toxicants Chemistry	AC 0907	2/2 s

{Level/semester, Compulsory Courses ‘c’ or selective ‘s’}.



11. Courses given by the Genetics Department (GE 10):

Course	Code	Food safety
Genetics1 (Fundamentals)	GE 1001	1/2 c
Genetics 2 (Cytology and Cytogenetics)	GE 1002	2/2 s
Molecular Biology	GE 1004	1/2 s
Genetically Modified Food	GE 1007	4/1 s

{Level/semester, Compulsory Courses ‘c’ or selective‘s’}.

12. Courses given by the Agricultural Engineering Department (AE 11):

Course	Code	Food safety
Agricultural Engineering (Fundamentals)	AE 1101	1/1 s
Biomathematics	AE 1102	1/1 c
Agricultural Bio-system Engineering	AE 1104	2/1 s
Food Engineering	AE 1106	1/2 s
Post-harvest Engineering	AE 1107	3/2 s

{Level/semester, Compulsory Courses ‘c’ or selective‘s’}.



كلية الزراعة/جامعة بنها
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برنامج الساعات المعتمدة
(برنامج كلية مشترك بين الأقسام العلمية)
برنامج مميز باللغة الإنجليزية
لطلاب مرحلة البكالوريوس
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