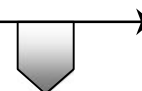


**Program of:
Science and Technology
of Sugar Industry
Diploma
(Agricultural Section)
(Program Scheme and
Courses Content)**

Program of Science and Technology of Sugar Industry Diploma (Agricultural Section)

First Year: First Semester

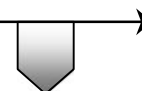
| Code | Course Title | No. H. | Prac. H. | Exams | | Grade |
|----------------------|---|---|----------|-------|-----|-------|
| | | | | Y.W. | Wr. | |
| SA5101 | Pests of Sugar Crops. | 2 | | 30 | 70 | 100 |
| SA5102 | Soil Fertility and Sugar Crop Fertilization. | 2 | | 30 | 70 | 100 |
| SA5103 | Companies Laws and Work Legislation. | 2 | | 30 | 70 | 100 |
| SA5104 | Sugar Crops Production. | 4 | | 60 | 140 | 200 |
| SA5105 | Language. | 2 | | 30 | 70 | 100 |
| | Elective Courses (A) * | 2 | | 30 | 70 | 100 |
| | Elective Courses (B) ** | 2 | | 30 | 70 | 100 |
| | Total | 16 | | 240 | 560 | 800 |
| | * Elective Courses (A) Choose one from the following: | <p>Note:</p> <p>Course Code Description:</p> <p>Course Name: AB CDEF</p> <p>(AB): is an indicator for the diploma name.</p> <p>(C) : is a number for graduate course level (from 1 to 4).</p> <p>(D) : is a number indicating the semester number.</p> <p>(EF): is a number indicating the serial number of the course during the semester.</p> | | | | |
| SA5106 | Water requirements of Sugar Crops. | | | | | |
| SA5107 | Biological Control of Insect Pests. | | | | | |
| SA5108 | Soil Chemistry. | | | | | |
| | ** Elective Courses (B) Choose one from the following: | | | | | |
| SA5109 | Industrial Fermentation. | | | | | |
| SA5110 | Environmental Chemistry. | | | | | |
| SA5111 | Soil Microbiology. | | | | | |
| *** Extended courses | | | | | | |



**Program of Science and Technology
of Sugar Industry Diploma
(Agricultural Section)**

First Year: Second Semester

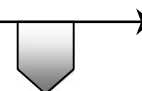
| Code | Course Title | No. H. | Prac. H. | Exams | | Grade |
|-----------------------------|---|--------|----------|-------|-----|-------|
| | | | | Y.W. | Wr. | |
| SA5201 | Genetic Engineering | 2 | | 30 | 70 | 100 |
| SA5202 | Technology of Sugar Industry (I). | 4 | | 60 | 140 | 200 |
| SA5203 | Pollution Control in Sugar Factories | 2 | | 30 | 70 | 100 |
| SA5204 | Economic and Management of Sugar Factories | 2 | | 30 | 70 | 100 |
| SA5205 | Technical Writing | 2 | | 30 | 70 | 100 |
| | Elective Courses (A)* | 2 | | 30 | 70 | 100 |
| | Elective Courses (B)** | 2 | | 30 | 70 | 100 |
| | Total | 16 | | 240 | 560 | 800 |
| | * Elective Courses (A) Choose one from the following: | | | | | |
| SA5206 | Diseases of Sugar Crops | | | | | |
| SA5207 | Sugar Crops Breeding | | | | | |
| SA5208 | Plant nutrition management | | | | | |
| | ** Elective Courses (B) Choose one from the following: | | | | | |
| SA5209 | Inorganic and Analytical Chemistry. | | | | | |
| SA5210 | Organic Chemistry. | | | | | |
| SA5211 | Experimental Design. | | | | | |
| *** Extended courses | | | | | | |



**Program of Science and Technology
of Sugar Industry Diploma
(Agricultural Section)**

Second Year: First Semester

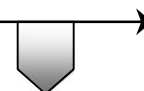
| Code | Course Title | No. H. | Prac. H. | Exams | | Grade |
|-----------------------------|---|--------|----------|-------|-----|-------|
| | | | | Y.W. | Wr. | |
| SA5301 | Agricultural Biochemistry | 2 | | 30 | 70 | 100 |
| SA5302 | Research Project ^{***} (to be continue) | 2 | | --- | --- | --- |
| SA5303 | Technology of Sugar Industry (II). | 4 | | 60 | 140 | 200 |
| SA5304 | Agricultural Laboratory (I) ^{***} | --- | 4 | 25 | 25 | 50 |
| SA5305 | Computer Programming. | 2 | | 30 | 70 | 100 |
| | Elective Courses (A)* | 2 | | 30 | 70 | 100 |
| | Elective Courses (B)** | 2 | | 30 | 70 | 100 |
| | Total | 16 | 4 | 205 | 445 | 650 |
| | * Elective Courses (A) Choose one from the following: | | | | | |
| SA5306 | In-Vitro Plant Tissue Culture | | | | | |
| SA5307 | Computer System and Performance Evaluation. | | | | | |
| SA5308 | Water and Soil Pollution | | | | | |
| | ** Elective Courses (B) Choose one from the following: | | | | | |
| SA5309 | Chemistry of Carbohydrates. | | | | | |
| SA5310 | Food Chemistry. | | | | | |
| SA5311 | Plant Equipment Planning. | | | | | |
| *** Extended courses | | | | | | |



**Program of Science and Technology
of Sugar Industry Diploma
(Agricultural Section)**

Second Year: Second Semester

| Code | Course Title | No. H. | Prac. H. | Exams | | Grade |
|--------|---|-----------------------------|----------|-------|-----|-------|
| | | | | Y.W. | Wr. | |
| SA5401 | Quality Control of Raw Materials (Cane & Beet) in Sugar Industry. | 2 | | 30 | 70 | 100 |
| SA5402 | Research Project *** | 2 | | 50 | 50 | 100 |
| SA5403 | Technology of Sugar Industry (III). | 4 | | 60 | 140 | 200 |
| SA5404 | Agricultural Laboratory (II) *** | --- | 4 | 25 | 25 | 50 |
| SA5405 | Statistical Analysis. | 2 | | 30 | 70 | 100 |
| | Elective Courses (A) * | 2 | | 30 | 70 | 100 |
| | Elective Courses (B) ** | 2 | | 30 | 70 | 100 |
| | Total | 14 | 4 | 255 | 495 | 750 |
| | * Elective Courses (A) Choose one from the following: | | | | | |
| SA5406 | By-products of sugar industry. | | | | | |
| SA5407 | Quality and Management. | | | | | |
| SA5408 | Fertilizers and Soil Amendments. | | | | | |
| | ** Elective Courses (B) Choose one from the following: | | | | | |
| SA5409 | Food Microbiology. | | | | | |
| SA5410 | Design of Industrial Waste Treatment Systems. | | | | | |
| SA5411 | Chemistry of Pesticides. | | | | | |
| SA5412 | Project Economics. | *** Extended courses | | | | |



First Year: First Semester

SA5101- Pests of Sugar Crops: (2h/w)

- 1- Economic importance and impact of pests attacking sugar crops (sugar cane and sugar beets).
- 2- Pest status in sugar crop ecosystems: insect pests, animal pests and weeds.
- 3- Agroecosystems and eco-distribution of key sugar cane and sugar beet pests.
- 4- Life cycles, types of damage and injury, and methods of sugar crop pest management.
- 5- Integrated pest management of sugar crops pests and determination of the critical damage levels.

SA5102- Soil Fertility and Sugar Crops of Fertilization: (2h/w)

- 1- Soil productivity and soil fertility.
- 2- Recovery of nutrients deficiency in soils.
- 3- Fertilizers need and types of fertilizers.
- 4- Plant growth and nutritional factors.
- 5- Requirements of sugar crops for nutrients during the stages of plant growth.
- 6- Methodology and time of fertilization of sugar crops.
- 7- Relationships between different fertilizers and growth, productivity and quality of sugar crops.
- 8- Foliar fertilizers and its role in sugar crops fertilization.

SA5103- Companies Laws and Work Legislations: (2h/w)

- 1- Law of work.
- 2- Individual and group work contracts.
- 3- Decrees of syndicates and companies.
- 4- Delimitations of employing delinquents and Women, Foreigners working for Egyptians and Egyptians working for foreigners.
- 5- Arabic and International work agreements.
- 6- Law of Social Insurance.
- 7- Kinds of Social Insurance.
- 8- Study of Decrees related to Special kind of social Insurance.
- 9- Distinguishing between Decrees of social insurance and other kinds of Insurance.

SA5104- Sugar Crops Production: (4h/w)

A. Production of Sugar Cane:

- 1- Economic importance.
- 2- History and current status of cane in Egypt.
- 3- Origin and classification of sugar cane.
- 4- Botany
- 5- Growth stages.
- 6- Sugar formation, transportation and storage.
- 7- Cultural practices.
- 8- Harvest.
- 9- Core of rations.
- 10- Mechanization of cane.

B. Production of Sugar Beet:

- 1- Economical importance.
- 2- World distribution.
- 3- Status in Egypt.
- 4- Origin.
- 5- Botany and Classification.
- 6- Sugar beet environment.
- 7- Thermal and light responses.
- 8- Growth relations and stages.
- 9- Flowering and seed setting.
- 10- Cultural practices in Egypt.

SA5105- Language: (2h/w)

- 1- Introduction.
- 2- Characteristics of the technical English.
- 3- Review of the English grammar.
- 4- Active sentences and its characteristics.
- 5- Some of the common errors in writing technical English sentences.
- 6- Phrasing: (Main idea – Methods of explaining the main idea – Types of phrases – Reading and analyzing some of the technical writing to develop the communication skills).

Note: This Course of Language is to be taught to all specialties.

Elective Courses
(First Year - First Semester)List (A)

SA5106-Water Requirements of Sugar Crops: (2h/w)

- 1- Terms and definitions.
- 2- Quality of irrigation water.
- 3- Sources of irrigation water in Egypt.
- 4- Methods of irrigation “ Traditional and modern systems”.
- 5- Water consumptive use for sugar crops.
- 6- Irrigation efficiency and efficiency of water use by sugar crops.
- 7- Drainage and leaching requirements.
- 8- Relationship between fertilization and efficiency of water use.
- 9- Methods of irrigation in different textured soils.
- 10-Salinity problems in soils and water.
- 11-Time and quantity of irrigation water for sugar crops.

SA5107-Biological Control of Insect Pests: (2h/w)

- 1- Nature and scope of biological control.
- 2- Ecological bases of biological control.
- 3- History and development of biological control.
- 4- Methods of biological control applications.
- 5- Entomophagous insects.
- 6- Microbial control.
- 7- Biological control of weeds.
- 8- Rule of biological control in Integrated Pest Management (IPM).

SA5108-Soil Chemistry: (2h/w)

The chemistry and composition of mineral and organic colloids in soil exchange, Oxidation-reduction, acidity, surface change and solution chemistry. Lectures pertain to plant nutrition, waste disposal and groundwater quality.

Elective Courses
(First Year - First Semester)List (B)

SA5109-Industrial Fermentation: (2h/w)

Microorganisms used in industrial fermentation – Equipments of fermentation – Substances, Media and solutions used as well as the methods of their preparation – Production of lactic acid – Production of ethyl alcohol – Production of citric acid – Production of Gluconic acid – Microbial production of lipids, protein, vitamins and growth hormones – Methods for diagnosis of fermentation products.

SA5110- Environmental Chemistry: (2h/w)

Air pollution: general consideration, carbon monoxide, nitrogen oxides, hydrocarbons and photochemical oxidants, sulfur oxides, particulates, temperature inversions and the green house effect, Water pollution, general consideration, detergents, synthetic organic pesticides, oil, toxic metals, wastewater treatment.

SA5111- Soil Microbiology: (2h/w)

Microbiology and biochemistry of the soil environment. Occurrence, distribution, ecology, and detection of microorganisms in soil.

First Year: Second Semester

SA5201-Genetic Engineering: (2h/w)

- 1- Introduction – Definition – Historical back ground principles.
- 2- Cell and, its components and types.
- 3- Bacteria and their species.
- 4- Blasmids, Virus and Microbial vectors.
- 5- Nucleic acid inheritance – structure and replication.
- 6- Protein and Enzymes synthesis.
- 7- Restriction enzymes.
- 8- DNA sequencing – gene transfer methods.
- 9- Plant tissue culture techniques applicable in genetic engineering.
- 10- Protoplast fusion – isolation, purification and fusion techniques.
- 11- Genetic engineering applications.
- 12- Genetic engineering techniques.
- 13- Genetics engineering and future prospects.

SA5202-Technology of Sugar Industry (I): (4h/w)

- 1- Juice clarification and purification of impurities and non sugar substances which adverse crystallization process.
- 2- Analysis and chemical composition of cane juice as well as physical properties.
- 3- Different methods of clarification as:
 - a- Use of lime solution and P_2O_5 (Source of P_2O_5 is tricalcium phosphate).
 - b- Use of lime solution and CO_2 after its purification to produce active calcium carbonate.
 - c- Details of chemical reactions in each method.
 - d- Advantages and defects of each method.
 - e- Sulphitation of syrup.
- 4- Refining of Egyptian raw sugar and imported.
 - a- Affination of raw sugar to remove films of non sugar from crystals in centrifuges and soluble sugar to solution.
 - b- Chemical treatment using lime and CO_2 (carbonation).
 - c- Chemical reaction which cause and factors, affect on reactions.
 - d- Purification of CO_2 and its Chemical neutralization.
 - e- Use of phosphatation method to clarification sugar soluble solution.
 - f- Decolourization of sugar soluble solution by bonechar, activated carbon, resins – advantage and defects of each method.
 - g- Boiling system in refining factories.

SA5203-Pollution Control in Sugar Industry:(2h/w)

- 1- Sources of air pollution and emissions.
- 2- Environmental impact of air pollution.
- 3- Thermodynamics, chemical kinetics and air pollution.
- 4- Meteorology and natural purification processes .
- 5- Engineered system for air pollution control.
- 6- Particles, its measurements and control.
- 7- Measurements and analysis of air pollutants.
- 8- Sources and control of water pollution in sugar Industry.
- 9- Engineered system for water pollution control.

SA5204- Economics and Management of Sugar Factories (2h/w)

- 1- Principles and rules of production economics determining the use of agricultural resources in sugar production.

- 2- Economic and productive efficiency in sugar industry.
- 3- Risk and uncertainty in sugar production.
- 4- Economic of scale.
- 5- Technological changes of sugar industry.
- 6- Planning of sugar factories – using some operations research tools, such as linear programming method and transportation models.
- 7- Practical and applied management of sugar factories.
- 8- Economic feasibility study of sugar factories and its financial analysis.

SA5205- Technical Writing: (2h/w)

- 1- Elements of technical reports.
- 2- Methods of engineering writing.
- 3- Methods of analyzing the engineering data.
- 4- Correct expressions and analytical reading.
- 5- Report of projects.
- 6- Report of experiments.
- 7- Assignment reports.

Note: This Course of Technical Writing is to be taught to all specialties.

Elective Courses

(First Year - Second Semester)List (A)

SA5206-Diseases of Sugar Crops: (2h/w)

- 1- Economic importance of sugar crops diseases.
- 2- Distribution and factors affecting plant pathogens.
- 3- Diseases of sugar crops: Physiological, bacterial, viral, mycoplasma and nematodes, parasitic flowering plants. integrated management of sugar crop diseases and recent approaches of control.

SA5207- Sugar Crops Breeding: (2h/w)

- 1- Principles of crop breeding and improvement, specially sugar crops.
- 2- Genetic basis of sugar crops breeding and improvement.
- 3- Sugar crops breeding methodology i.e., selection methods – hybridization – mutation breeding. Biotechnology in breeding.
- 4- Stress breeding of sugar crops i.e., heat, drought, salinity, pests (insects & diseases).

SA5208-Plant Nutrition Management: (2h/w)

Functions, requirements and uptake of essential plant nutrients; chemical and microbial processes affecting nutrient availability; diagnosis of plant and soil nutrient status; fertilizers and efficient fertilizer use in different tillage systems.

Elective Courses

(First Year - Second Semester)List (B)

SA5209- Inorganic and Analytical Chemistry: (2h/w)

A. Inorganic Chemistry:

- Acids and bases.
- Additional aspects of acid – bases equilibria (Common ion effect in acid – bases equilibria – buffer solutions – acid dissociation).
- Transition metal – carbonyls and related compounds.

B. Solubility and Complex Ion Equilibria:

- Solubility and solubility product constant.
- Solubility and pH.
- Equilibria involving complex ions.

C. Volumetric and Gravimetric Methods of Analysis:

- Neutralization titrations and titration curves for acid/base system.
- Complex-formation titrations.
- Oxidation-reduction titrations.
- Precipitation reactions in quantitative analysis.
- Gravimetric methods of analysis.

SA5210- Organic Chemistry: (2h/w)

1- Physical organic chemistry:

Types of organic reactions, Mechanisms of organic reactions.

2- Reactions of carbonyl compounds:

Acid and base catalyses (specific and general),
Nucleophilic addition reaction of carbonyl compounds
on nitrogen and carbon nucleophiles.

3- Cyclic addition reactions:

Classifications, Thermocyclic addition reactions,
Dipolar cyclic addition reactions.

4- Photochemistry:

The excited electronic states and Jablonski diagram, Properties of photoreactions, Reactions of: unsaturated organic carbon compounds, carbonyl compounds and aromatic compounds.

SA5211- Experimental Design: (2h/w)

- 1- Statistical basis of biology in experimental design.
- 2- Analysis of variance in experiments.
- 3- Experimental designs & statistical analysis.
- 4- Correlation & regression & X test.
- 5- Experimental designs & statistical analysis.
- 6- Correlation & regression & X test.
- 7- Results presentation and explanation of experiments.

Second Year: First Semester

SA5301- Agricultural Biochemistry: (2h/w)

- ***Acid, Bases and Buffers.***
- ***Carbohydrates:***
Classes, Structure, reactions of monosaccharides, physico-chemical properties of oligo- and polysaccharides.
- ***Amino acids and proteins:***
Structure and chemical properties of Amino Acids, structure of protein, types of protein structure, Classification of proteins, some properties of protein.
- ***Lipids:***
Types of lipids, Fatty acids, derivatives lipids, complex lipids.
- ***Nucleic Acids:***
Nucleic acid composition, function of nucleotides, structure and properties of DNA, Replication of DNA, Genetic code, mutations, Types and properties of RNA.
- ***Enzymes:***
General chemistry of enzymes, protein nature of enzyme, equilibria and free-energy changes in biochemical reactions, coupled reactions, kinetics of enzyme action, Inhibition of enzyme action, mechanism of enzyme action, Coenzymes.
- ***Metabolism of carbohydrates.***
- ***Metabolism of proteins.***

- **Metabolism of lipids.**
- **Vitamins:**
Fat soluble vitamins, water-soluble vitamins, vitamin like-substances.
- **Hormones:**
General aspects of hormones, Mechanism action of hormones

SA5302-Research Project: (2h/w) (to be Continue)

The project must be in one of the problems related to different areas of agricultural.

SA5303-Technology of Sugar Industry (II) : (4h/w)

- 1- Definition of sugar manufacture and introduction on manufacture steps.
- 2- Cane preparation.
- 3- Extraction of the juice by milling and diffusion.
- 4- Filtration of mixed juice.
- 5- Heating of the juice.
- 6- Clarification of the juice after treatment by precipitation.
- 7- Filtration of scums.
- 8- Filtration of clarified juice outside clarification tanks.
- 9- Juice concentration by evaporation of water in multiple evaporation – explain design principles of multiple.
- 10- Cleaning heat surface of heaters, bodies of multiple evaporation of pan boiling.
- 11- Preparation of superphosphate solution.
- 12- Preparation of lime solution.
- 13- Preparation of SO.
- 14- Design and calculation capacity of instrument for each steps which mention previously.

SA5304-Agricultural Laboratory (I) *: (4h/w)**

Experiments should be done at faculty of agricultural in the following departments:

- 1- Genetic.
- 2- Plant Pathology.
- 3- Plant Protection.
- 4- Agronomy.
- 5- Soil and Water.
- 6- Food Science and Technology.

SA5305-Computer Programming :(2h/w)

- 1- Computer components. (computer generation – components – input and output units – control unit – microprocessor – memory – decimal operational system and special letters and characters).
- 2- Basic programming
- 3- Fortran programming
- 4- Cobol programming

Elective Courses

(Second Year - First Semester)List (A)

SA5306- In-Vitro Plant Tissue Culture: (2h/w)

- 1- Basic laboratory equipment and plant tissue culture.
- 2- Sterilization.
- 3- Contents of plant tissue culture media.
- 4- Callus induction and maintenance.
- 5- Stem and Apical culture.
- 6- Liquid medium and root culture.
- 7- Using the techniques of plant tissue in solving special problems in plant breeding programme.
- 8- Examples of applications of in vitro tissue in plant breeding.
- 9- Anther culture, Embryoculture, Cell culture.
- 10-Isolation and culturing of protoplast.
- 11- Protoplast fusion and somatic embryos.
- 12-Future applications of plant tissue culture.

SA5307-Computer Systems and Performance Evaluation: (2h/w)

Provides a comprehensive overview of the quantitative aspects of computer systems with a particular focus on performance evaluation. Topics include performance measurement, the analysis and interpretation of measurement data, workload characterization and modeling, the design and evaluation of performance experiments, and the design and application of analytical techniques. A variety of application domains will be considered.

SA5308- Water and Soil Pollution: (2h/w)

Water cycle, Sources of pollution (industrial activity, agricultural activity, sewage disposal, etc.), Effects (eutrophication, decrease of soil fertility, etc.), impacts (health hazards, destruction of productive ecosystems, etc.), Water and soil pollution standards, Control of water and soil pollution, water purification.

Elective Courses
(Second Year - First Semester)List (B)

SA5309-Chemistry of Carbohydrates: (2h/w)

1- Monosaccharides:-

Structural and Nomenclature (cyclic forms, Anomeric effect)

- Synthesis of Monosaccharides (Chain extension reactions, isomerization reactions, total synthesis).
- Reactions of Monosaccharides (isomerization in mild base, fragmentation in a strong base, dehydration in an aqueous acid, reactions with alcohols, amines, phenylhydrazine, thiols, reductions, oxidations esterifications, cyclization, etherification, glycosidation).
- Synthesis of Monosaccharide derivatives (Amino sugar synthesis, oligosaccharide synthesis).

2- Disaccharides:

Definition, Nomenclature, Classification, general methods for determination of their structures, Occurrence, Preparation of maltose, cellobiose, lactose, gentiobiose, melibiose and sucrose.

SA5310- Food Chemistry: (2h/w)

Water - Enzyme utilization in food industry – Amino acids – Peptides – Proteins – Lipids – Carbohydrates – Aroma substances – Vitamins – Minerals – Food additives – Food contamination.

SA5311- Plant Equipment Planning: (2h/w)

Design and building up of chemical plants. The role of chemical engineer at design of chemical plants. Material and heat balance in projection. Utilization of static and dynamic simulations in design. Transport and dimension of traffic in chemical plants. Energy transfer, heating - cooling, Separation processes in inorganic technology. Absorbers and their characteristics. Drying, types and characteristics of driers. Crystallization, types and characteristics of equipments, Reactors, design and bases for calculation. Simple calculation of ideal reactors, Project equations for tube and batch reactors. Calculation of nonisothermal and nonadiabatic tube reactors.

Second Year: Second Semester

**SA5401-Quality Control of Raw Materials (Cane & Beet) in
Sugar Industry: (2h/w)**

- 1- Quality criteria of cane and beet according to the requirements of sugar industry.
- 2- Sucrose content, non sucrose and negative ingredients, extraneous matter, fiber, recoverable commercial sugar.
- 3- Direct analysis of cane and beet.
- 4- Measures of improving cane and beet quality:
 - Per-harvest maturity test and supplying based on maturity.
 - Strict rule for supplying clean cane and beet.
 - Setting of maximum field – to- factory time.
 - Cane and beet payment based on recoverable sugar.
 - Time control between weighing and processing.
 - Punitive measure for supplying stale cane or bad quality beet.
- 5- Source of sugar losses pre-processing:
 - Harvesting method, loading, duration of transportation, storage at field and factory.
- 6- Quality control in delivered cane and beet:
 - Random – trash control – core sampling and raw material laboratory control (payment by quality).

SA5402-Research Project^{*}: (2h/w)**

SA5403-Technology of Sugar Industry (III) : (4h/w)

- 1- Study of relationship between degree of sucrose solubility, temperature and pressure, definite types of different sugar solutions.
- 2- Theory of sucrose crystallization in pure and impure sugar solutions.
- 3- Sucrose crystallization by concentration of sugar solutions under vacume.
- 4- Sucrose crystallization by cooling masecoute.
- 5- Boiling system in different sugar factories.
- 6- Separation of sugar crystals from mother liquor (centrifuges), types, models – use of each centrifuge.
- 7- Sugar drying – explaine theory of drying different types of dryers.

- 8- Carbonation of dry sugar, separation of crystal clumps, types and usage importance.
- 9- Weight and sugar packing, degree of accuracy of weight.
- 10- Conveyor (transport) of packing sugar and storage methods.
- 11- Design and calculation capacity of different instrument for each steps which mention previously.

SA5404-Agricultural Laboratory (II)*: (4h/w)**

Practicum at faculty of agricultural in the following departments:

- 1- Genetic.
- 2- Plant Pathology.
- 3- Plant Protection.
- 4- Agronomy.
- 5- Soil and Water.
- 6- Food Science and Technology.

SA5405-Statistical Analysis: (2h/w)

b- Statistical Analysis:

1- Descriptive statistics:

classification of data – graphic presentation –
central mean measurement – measure of variation
– examples using the computer.

2- Linear Regression and correlation:

Scattering graph – linear and nonlinear curve
fitting for two groups of data function in two
variables – prediction – linear correlation
coefficient (Berson) and its relation to the linear
regression coefficient – meaning of linear
correlation coefficient, examples using computer.

3- Distribution:

Binomial – Poisson – Normal distribution,
properties and its use.

4- Estimation and Hypotheses Testings:

Population – sample – parameter – point and
interval estimation – confidence interval –
difference between two means of normal
distributions – confidence interval around of unit
proportion, difference between two proportions –
minimum and alternative hypothesis –
significance level – mean hypothesis test has one
difference between two means of normal
distribution – unit mean hypothesis test and

difference between two means – examples using
computer.

Elective Courses
(Second Year - Second Semester)List (A)

SA5406-By-Products of Sugar industry: (2h/w)

- 1- General principles for selection, preparation and activation of microbial cultures (bacteria – yeast – fungi) and their preservation.
- 2- Selection and preparation of cultures and fermentatives utilized in fermentation process and advantages of by-products of sugar industry in industrial fermentation.
- 3- Role of industrial fermentation in production of organic acids (Acetic acid – Citric acid – Fumaric acid – Gluconic acid).
- 4- Role of industrial fermentation in alcohols production (Ethyl – Butyl), Acetone.
- 5- Antibiotics production – Vitamins production.
- 6- Enzymes production, single – cell proteins production.

SA5407- Quality and management: (2h/w)

- Quality processes throughout the world.
- Management principles.
- Quality management principles.
- ISO 9000 and ISO 14000 registration.
- Quality function deployment.
- Certification and communication.

SA5408-Fertilizers and Soil Amendments: (4h/w)

Fertilizers and soil amendments used to manage plant requirements including the economics, storage, handling, blending and application of synthetic fertilizers, manure and lime. Also covers the major nutrient cycles, nutrient deficiency symptoms and soil testing.

Elective Courses
(Second Year - Second Semester)List (B)

SA5409-Food Microbiology: (2h/w)

- Microbial spoilage of cereal and cereal products.
- Microbial spoilage of fruit and vegetable and their products.
- Microbial spoilage of meat, poultry, fish, egg, milk and their products.
- Microbial spoilage of sugar, honey, syrups, jam, juices and refreshments.
- Microbial spoilage of canned foods.
- Fundamentals of food preservation.

SA5410- Design of Industrial Waste Treatment Systems: (2h/w)

Designed to provide the student with the fundamentals of air and water pollution problems and the control technology and legislation associated with these problems.

SA5411-Chemistry of Pesticides: (2h/w)

Introduction about the historical uses of pesticides – study of chemical composition and its relation to toxicity of pesticides belong to different chemical groups (inorganic, chloronic, phosphoric, carbamic, pyrothrodates, phenylben zoylvrea) – subs of pesticides.

SA5412- Project Economics: (2 h/w)

- 1- An overview, the role of projects in economic development.
- 2- Economic Environment.
- 3- Determinants of project efficiency and its indicators.
 - Kinds of efficiency – industry viz project, technical viz economic.
 - Determinants of efficiency.
 - Indicators of efficiency (Productivity & Profitability).
- 4- Pricing methods in theory & practice.
- 5- Demand analysis.
- 6- Project appraisal (financial and commercial studies).
- 7- Cases.