

**ISSAM M. FARES FACULTY OF  
TECHNOLOGY**

# **FACULTY LIST**

## **OFFICERS OF THE FACULTY**

Warrak, Elias	President of the University
Bahr, Georges	Acting Provost
Karam, Elie	Dean, Issam Fares Faculty of Technology
Tekli, Gilbert	Associate Dean, Issam Fares Faculty of Technology

## **FACULTY STAFF**

Abboud, Anis	Hardware Application Specialist
Abdallah, Jean	Program Coordinator
Attieh, Ghassan	Maintenance
Borgi, Sally	Administrative Assistant
Elias, Camelia	Administrative Assistant
Elias, Georgia	Laboratory Assistant
Gergess, Marie-Louise	Administrative Assistant, Admissions and Registration
Hanna, Inaam	Library Assistant
Ibrahim, Nicole	Junior Accountant - Comptroller's office
Khoury, Ahlam	Public Relations, Orientation
Khoury, Habib	Sporting Activities Coordinator
Sahmarani, Sary	Administrative Assistant, Orientation
Wehbeh, Laura	System Administration

## **FACULTY MEMBERS**

Abi Kaed Bey, Samer	PhD, Measurement and Instrumentation City University, London, UK
Antoun, Mireille	M.S, Computer Engineering University of Balamand, Lebanon
Arairo, Wahib	PhD, Civil Engineering INSA, Lyon, France
Bakhit, Salma	PhD, Economical Science Université Aix-Marseille, France
Berbari, Racha	PhD, Signal and Image Processing Telecom ParisTech, France
Bitar, Angela	MS, Aircraft Maintenance Institut de Maintenance Aéronautique, Bordeaux I, France
Chanbour, Ibrahim	PhD, Electrical Engineering St. Petersburg, Russia
Dagher, Walid	PhD, Business Administration Université Aix-Marseille, France
El Balaa, Rodrigue	PhD, Agricultural Sciences INPL, France
Fares, Roula	PhD, Applied Mathematics Université Jean Monnet, France
Ghazi, Georgina	M.S, Electrical Engineering University of Balamand, Lebanon

Karam, Elie	Ph.D., Biomedical Engineering, Rutgers, The State University of New Jersey, USA
Maarawi, Sonia	B.E, Civil Engineering Lebanese University, Lebanon
Mattar, Claudia	PhD, Engineering and Quality Management Polytechnic University of Bucharest, Romania
Mezannar, Nay	PhD, Mechanics and Advanced Science Engineering University of Bologna, Italy
Nachar, Rabih	PhD, Computer Engineering and Automatic Control Université de Versailles, France
Nasr, Dima	M.S, Mechanical Engineering University of Balamand, Lebanon
Nehme, Anita	DEA, Socio-Economy Université Lumière 2 Lyon, France
Sayah, Jinane	PhD, Electronics Information and Systems Université Paris-Est, France
Serhan, Carole	PhD, Business Administration University of Nicosia, Cyprus
Tekli, Gilbert	PhD, Computer Science and Engineering Telecom St Etienne and Bourgogne University, France
Yaacoub, Saly	PhD, Physics Université de Montpellier II, France

# **PROGRAMS OF STUDIES**

The Issam Fares Faculty of Technology offers three year programs leading to the Bachelor of Technology degree in the following departments:

- Aircraft Maintenance
- Mechatronics
- Telecommunications and Networks
- Agriculture and Food
- Civil and Construction
- Management and Administration
- Information Technology

With a Bachelor of Technology, the graduate is ready to begin professional practice. On the other hand, the graduate may apply to advanced studies leading to a Bachelor of Engineering (BE) Degree in related fields, provided he/she has obtained a cumulative general average of at least 75 in the undergraduate studies; final decision on acceptance to the BE Degree program resides with the Admissions Committee of the faculty, and successful completion of required remedial courses.

## **UNDERGRADUATE PROGRAMS**

### **1. ADMISSION REQUIREMENTS**

#### **A. ENGLISH TRACK STUDENTS:**

1. Lebanese Baccalaureate or its equivalent
2. Acceptable scores on the SAT

#### **B. FRENCH TRACK STUDENTS:**

1. Lebanese Baccalaureate or its equivalent
2. Acceptable scores on the entrance exams, which consist of the DELF and a Math exam.

Admission to the undergraduate program in the Issam Fares Faculty of Technology is normally restricted to the first year. However, in exceptional cases, and with the approval of the Admissions Committee, students transferring from other accredited institutions may be considered for admission.

### **2. LANGUAGE REQUIREMENTS:**

#### **A. ENGLISH TRACK STUDENTS:**

Applicants to any English Track program of the Issam Fares Faculty of Technology should demonstrate proficiency in the English level. This can be done by submitting official test scores for one of the following tests: TOEFL, SAT or IELTS.

In order to be accepted in any English track program, the applicant should be placed in English level ENGL003 or above.

#### **B. FRENCH TRACK STUDENTS:**

Applicants to any French Track program of the Issam Fares Faculty of Technology should demonstrate proficiency in the French level. To ascertain this proficiency, the candidate must sit for the French entrance exam and be placed in French level FREN 002 or above.

### **3. ACADEMIC RULES AND REGULATIONS**

#### **A. EVALUATION OF ACADEMIC PERFORMANCE**

Refer to the General Section.

#### **B. DEAN'S HONOR LIST**

Refer to the General Section.

### **4. REMEDIAL COURSES**

Students applying for admission to the Issam Fares Faculty of Technology (IFFT) from non-scientific Baccalaureate Background are given the following remedial courses based on their intended major, as mentioned below:

<b>IFFT</b>	<b>SE-SB</b>	<b>SE-LB</b>	<b>LH</b>
	<b>Remedial Courses</b>	<b>Remedial Courses</b>	<b>Remedial Courses</b>
Civil and Construction Technology Aircraft Maintenance Technology	MATH 113 (3cr)	MATH 112 (3cr) MATH 113 (3cr)	MATH 111 (3cr) MATH 112 (3cr) MATH 113 (3cr)
Management and Administration Technology			MATH 111 (3 cr)
Agriculture and Food	CHEM 102 (3cr)	CHEM 102 (3cr) PHYS 102 (3cr)	BIOL 101 (3cr) CHEM 100 (3cr) CHEM 102 (3cr) MATH 111 (3cr) PHYS 102 (3cr)
Mechatronics Technology Telecommunication and Networking	MATH 113 (3cr) PHYS 102 (3cr)	MATH 112 (3cr) MATH 113 (3cr) PHYS 100 (3cr) PHYS 102 (3cr)	MATH 111 (3cr) MATH 112 (3cr) MATH 113 (3cr) PHYS 100 (3cr) PHYS 102 (3cr)

Students with Technical Baccalaureate (BT) background are given the following remedial courses based on their intended major (the choice of the major should be in conformity with their BT degree, as stated by the decree of the ministry of education and higher education), as mentioned below:

<b>Intended Major</b>	<b>Remedial courses</b>
Civil and Construction Technology Aircraft Maintenance Technology Mechatronics Technology Telecommunication and Networking	CHEM 102 (3cr) MATH 112 (3cr) MATH 113 (3cr) PHYS 100 (3cr)
Agriculture & Food	BIOL 101 (3cr) CHEM 102 (3cr) MATH 112 (3cr) PHYS 100 (3cr)
Management and Administration Technology	ECON 101 (3cr) MATH 111 (3cr) MATH 105 (3cr)

## **4. LABORATORY CHARGES**

### **A. SUPPLIES**

Each student taking laboratory subjects must furnish, at his/her expense, the necessary notebooks, blank forms, lab coat, and similar supplies. For regular students taking prescribed laboratory work, no charge is made for normal amounts of expendable material used in connection with laboratory subject. Expendable materials are those that are necessarily consumed or rendered unfit for further use in the normal conduct of a laboratory test. If an excessive amount of expendable material is required because of carelessness on the part of the student, the cost of the additional material will be charged to the student or group responsible.

### **B. DAMAGES**

Students will be charged for damage to instruments caused by lack of care. The amount of the charge will be the actual cost of repair, and if the damage results in total loss of the apparatus, adjustment will be made in light of the condition of the instruments. Where there is danger of costly damage, an instructor will be asked to check the set up. When a group does laboratory work, charges for breakage will be divided among the members of the group concerned. The amount of the charge will be stated at the time or as soon as it can be determined.

# **AIRCRAFT MAINTENANCE TECHNOLOGY**

In the ever-growing aeronautical world, the need for maintenance personnel is increasing. The Aircraft Maintenance Technology (AMT) program is designed to prepare students to meet the challenging demands of an ever growing aeronautical world and the needs for a properly trained maintenance personnel. Through high quality (technology) education, the mission of the Aircraft Maintenance department is to prepare well-rounded aircraft maintenance personnel capable of seeking higher licenses in order to help regional airline companies keep their expanding fleets airworthy.

## **Objectives:**

The programs in Aircraft Maintenance Technology aim at preparing students to apply the principles, techniques and methods specific to the aeronautical field and those that characterize the regulatory framework, both national and international. The program also aims at preparing future technologists in the necessary technological skills of various activities in airplanes and helicopters, which also contributes to job mobility. After a few years from graduation, the graduates of the B.Tech. programs will be able to:

- Apply the acquired background – aviation physics, mathematics, aerodynamics, computer techniques, and applied procedures and skills in the practice of market place to maintain a variety of aircraft systems to the highest standards, or to pursue the technology education;
- Succeed as aircraft maintenance professionals in solving maintenance problems, implementing regulations, and managing technical matters (issues) in the specialized fields of avionics or airframes and engines;
- Apply proper interpersonal and communication skills to be productive members in a teamwork environment, and to act professionally and ethically.
- Engage in professional growth and lifelong development activities, and emerging issues related to aircraft maintenance practice

## **Outcomes:**

Upon completion of the program, students will acquire knowledge and skills that enable them to:

- Apply the Aircraft Maintenance Practical skills and Hands-on necessary for technology practice and work with different tools and materials;
- Perform the basic inspection maintenance repair and overhaul and manufacturing on aircraft materials with various measurements techniques;
- Identify, formulate, and solve technical problems;
- Understand propulsion sciences, airplane hydraulic, pneumatic, electrical and fuel systems;
- Integrate and apply the knowledge, the understanding and the skills in computational techniques, aircraft maintenance management;
- Design and develop projects in related fields;
- Play active roles in work team environment;
- Write professional reports in term of content and form and give professional presentations and speak in public.

# **BTECH – AIRCRAFT MAINTENANCE TECHNOLOGY** **(AVIONICS)**

## **SEMESTER 1**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 211	Aviation Mathematics	3
ACMN 212	Basic Aviation Physics	3
ACMN 213	Electrical Engineering Fundamentals	3
ACMN 214	Basic Aeronautics and Aerodynamics	3
CSIS 218	Computer Skills for Applied Technology	1
<b>Total</b>		<b>13</b>

## **SEMESTER 2**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 221	Electronic Fundamentals	3
ACMN 222	Materials and Hardware	3
ACMN 223	Maintenance Practices I	3
ACMN 224	Technical Drawing I	1
AVEN 212	Basic Aviation English	3
COMP 221	Computer Techniques II	1
MATH 218	Aviation Mathematics II	3
<b>Total</b>		<b>17</b>

ACMN 250	Industrial Training I	4
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## **SEMESTER 3**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 231	Human Factors & Regulatory Frameworks	3
ACMN 234	Digital Techniques and Instrumentation	3
ACMN 235	Maintenance Practices II	3
ACMN 236	Technical Drawing II	1
ACMN 237	Aircraft Aerodynamics and Structures	3
ACMN 238	Propulsion I	3
<b>Total</b>		<b>16</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 244	Propellers	3
ACMN 245	Maintenance Practices III	3
ACMN 246	Avionics Lab I	3
ACMN 247	Aircraft Systems	3
ACMN 248	Propulsion II	3
ENGL 203	English Communication Skills III	3
LISP 200	Library Use and Research Methods	1
<b>Total</b>		<b>19</b>
ACMN 350	Industrial Training II	4

**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 311	Lebanese Aviation Regulations	3
ACMN 312	Helicopter Studies I	3
ACMN 314	Maintenance Planning and Scheduling	3
ACMN 315	Reciprocating Engines	3
ACMN 313	Piston Engine Aeroplanes I	3
TECH 390	Graduation Project Design	2
<b>Total</b>		<b>17</b>

**SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 325	Modern Avionics Systems	3
ACMN 326	Avionics Lab II	3
TECH 391	Graduation Project Implementation	2
AVEN 242	Maintenance Aviation English	3
	Elective	3
<b>Total</b>		<b>14</b>
<b>Total Credits</b>		<b>104</b>

**ELECTIVES****SEMESTER 6:**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 320	Technology in Entrepreneurship	3
ACMN 331	Aircraft Interiors	3
ACMN 332	CAD/CAM	3
ACMN 323	Maintenance Organization Management	3

# **BTECH – AIRCRAFT MAINTENANCE TECHNOLOGY** **(AIRFRAMES AND ENGINES)**

## **SEMESTER 1**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 211	Aviation Mathematics	3
ACMN 212	Basic Aviation Physics	3
ACMN 213	Electrical Engineering Fundamentals	3
ACMN 214	Basic Aeronautics and Aerodynamics	3
CSIS 218	Computer Skills for Applied Technology	1
<b>Total</b>		<b>13</b>

## **SEMESTER 2**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 221	Electronic Fundamentals	3
ACMN 222	Materials and Hardware	3
ACMN 223	Maintenance Practices I	3
ACMN 224	Technical Drawing I	1
AVEN 212	Basic Aviation English	3
COMP 221	Computer Techniques II	1
MATH 218	Aviation Mathematics II	3
<b>Total</b>		<b>17</b>
ACMN 250	Industrial Training I	4

## **SEMESTER 3**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 231	Human Factors & Regulatory Frameworks	3
ACMN 232	Turbine Aeroplane Aerodynamics	3
ACMN 233	Gas Turbine Engines I	3
ACMN 234	Digital Techniques and Instrumentation	3
ACMN 235	Maintenance Practices II	3
ACMN 236	Technical Drawing II	1
<b>Total</b>		<b>16</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 241	Turbine Aeroplane Structures	3
ACMN 242	Turbine Aeroplane Systems	3
ACMN 243	Gas Turbine Engine II	3
ACMN 244	Propellers	3
ACMN 245	Maintenance Practices III	3
ENGL 203	English Communication Skills III	3
LISP 200	Library Use and Research Methods	1
<b>Total</b>		<b>19</b>
ACMN 350	Industrial Training II	4

**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 311	Lebanese Aviation Regulations	3
ACMN 312	Helicopter Studies I	3
ACMN 313	Piston Engine Aeroplanes I	3
ACMN 314	Maintenance Planning and Scheduling	3
ACMN 315	Reciprocating Engines	3
TECH 390	Graduation Project Design	2
<b>Total</b>		<b>17</b>

**SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 321	Helicopter Studies II	3
ACMN 322	Piston Engine Aeroplanes II	3
TECH 391	Graduation Project Implementation	2
AVEN 242	Maintenance Aviation English	3
Elective	Elective Course	3
<b>Total</b>		<b>14</b>

**Total Credits** **104**

**ELECTIVES****SEMESTER 6:**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ACMN 320	Technology in Entrepreneurship	3
ACMN 331	Aircraft Interiors	3
ACMN 332	CAD/CAM	3
ACMN 323	Maintenance Organization Management	3

## **COURSE DESCRIPTIONS**

### **ACMN 211 AVIATION MATHEMATICS**

**3.0:3 cr. E**

This course is technically oriented toward applications. We use mathematical formulation to analyze aircraft data ranging from speed simulation to measurement of horizontal and vertical air flow in order to assess risk factors.

It teaches students how to apply the concepts of mathematic operations in engineering applications. It introduces students to techniques that help them connect mathematical knowledge to aircraft real problems.

### **ACMN 212 BASIC AVIATION PHYSICS**

**3.0:3 cr. E**

Nature of matter, molecules; states, forces, moments and couples, representation as vectors, center of gravity, elements of theory of stress, strain and elasticity, linear movement, rotational movement, periodic motion, gyroscopic principles, friction, dynamic and total pressure, temperature, heat transfer, first and second law of thermodynamics, gases, laws of reflection and refraction, wave motion, sound.

### **ACMN 213 ELECTRICAL ENGINEERING FUNDAMENTALS**

**3.0:3 cr. E**

Structure and distribution of electrical charges, units of charge, Coulomb's law, conduction of electricity, production of electricity, construction and basic chemical action; operation of photo-cells, Ohm's law, Kirchoff's Voltage and Current Laws, construction of Wheatstone Bridge, power, work and energy, operation and function of a capacitor, theory of magnetism, DC generator, AC theory, RLC circuits, Transformers, Filters, AC generators, AC motors.

### **ACMN 214 BASIC AERONAUTICS AND AERODYNAMICS**

**3.0: 3 cr. E**

Physics of the atmosphere, International Standard Atmosphere, aerodynamic forces, flow around a body, boundary layer, up- and down-wash, airfoil geometry, wash in and wash out, thrust, weight and aerodynamic resultant, airfoil contamination including ice, snow and frost, Theory of Flight, performance, flight envelope and structural limitations, longitudinal, lateral and directional stability (passive and active).

### **ACMN 221 ELECTRONIC FUNDAMENTALS**

**3.0:3 cr. E**

Semiconductors, Materials, electron configuration, electrical properties, P and N type materials and junction, Diode parameters, rectifiers, diode, Transistors, construction and operation of PNP NPN and other type transistors, applications and simple circuits, Integrated circuits, description and operation of logic circuits, linear circuits and operational amplifiers, Printed circuit boards, Servomechanisms, E and I transformers, inductance and capacitance transmitters, Servomechanism defects, lead reversal and hunting.

### **ACMN 222 MATERIALS AND HARDWARE**

**3.0: 3 cr. E**

Ferrous aircraft materials, Non-Ferrous aircraft materials, Composites and non-metallic aircraft materials, identification of common alloy steels used in aircraft, sealant and bonding agents, Wooden structures, preservation and maintenance of wooden structures, Fabric covering, Corrosion, formation, identification, causes, Fasteners, screws, bolts, studs and nuts, Locking devices, Rivets, Pipes and Unions, Springs, Bearings, Transmissions, Control Cables, Electrical Cables and Connectors.

### **ACMN 223 MAINTENANCE PRACTICES I**

**3.0:3 cr. E**

Safety Precautions-Aircraft and Workshop, Workshop Practices, Hand and Powered Tools, Measuring Tools, Electrical Test Equipment, Lubrication, Fits and Clearances, Continuation, Insulation, Bonding, Crimping, Electric Wires and Cables, EWIS, Aircraft Weight and Balance, Introduction to Nondestructive Inspections including Dye Penetration, Radiography, Eddy Current, Ultrasonic and Borescope methods.

**ACMN 224 TECHNICAL DRAWING I****0.3:1 cr. E**

Equipment and basic drawing procedures, lettering and symbols, drafting geometry and single-view drawing, orthographic projection, dimensions, auxiliary views, sectional views, pictorial drawing (isometric and perspective), threads, weldments, developments, introduction to descriptive geometry, introduction to computer drafting, working drawings.

**ACMN 231 HUMAN FACTORS AND REGULATORY FRAMEWORKS****3.0:3 cr. E**

Importance of human factors in aviation, human error and incidents, "Murphy's Law", Human performance and limitations, Social psychology, Physical environment, Tasks, Communication, Human error, Hazards in the workplace, Regulatory framework, role of ICAO and EASA, relationships between Parts 145, 66, 147 and M, relationship with other aviation authorities, maintenance staff certification, approved maintenance organizations.

**ACMN 232 TURBINE AEROPLANE AERODYNAMICS****3.0:3 cr. E**

Theory of Flight, Aeroplane Aerodynamics and Flight Controls, operation and effect of roll control, High lift devices, Drag inducing devices, Effects of wing fences, Boundary layer control, Operation and effect of trim tabs, High speed flight, Mach number, critical Mach number, Factors affecting airflow in engine intakes of high speed aircraft, Effects of sweepback on critical Mach number.

**ACMN 233 GAS TURBINE ENGINES I****3.0:3 cr. E**

Fundamentals: Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle, Engine Performance, Inlets, Compressors, Combustion Section, Turbine Section, Exhaust, Engine noise reduction, thrust reversers, Bearings and Seals, Lubrication Systems, Fuel Systems, Air Systems, Starting and Ignition Systems, Engine Indicating Systems: Exhaust Gas Temperature, Interstage Turbine Temperature, Engine thrust indication

**ACMN 234 DIGITAL TECHNIQUES AND INSTRUMENTATION****3.0:3 cr. E**

Electronic Instrument Systems, Numbering Systems, Data Conversion, Data Buses, Logic Circuits, Basic Computer Structure, Microprocessors, Integrated Circuits, Multiplexing, Fibre Optics. Electronic Displays, Cathode ray tubes, light emitting diodes, liquid crystal displays. Electrostatic Sensitive Devices, Software Management Control, Electromagnetic Environment, Typical Electronic/Digital Aircraft Systems.

**ACMN 235 MAINTENANCE PRACTICES II****3.0:3 cr. E**

Bearings, Transmissions, Control Cables: Swaging of end fittings, inspection and testing, Bowden cables, aircraft flexible control systems. Composite and Non-metallic Materials Handling: Bonding practices, environmental conditions, inspection methods. Nondestructive Inspections. Riveting: Solid, Blind. Pipes and Hoses, Springs, Sheet Metal: Marking out and calculation of bending allowance, bending and forming, inspection. Welding, Brazing, Soldering and Bonding: Methods and inspection, abnormal events.

**ACMN 236 TECHNICAL DRAWING II****0.3:1 cr. E**

3-D CAD: Geometric solids, angled surfaces, curved surfaces. Pictorial Illustration: Perspective, rendering. Working Drawings: Industrial manufacturing, details, and assemblies. Product Design Drawings, aircraft and spacecraft, mechanical systems, gears and cams.

**ACMN 237 AIRCRAFT AERODYNAMICS AND STRUCTURES****3.0:3 cr. E**

Theory of Flight, Aeroplane Aerodynamics and Flight Control, High Speed Flight: Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number. Rotary Wing Aerodynamics: Terminology, operation and effect of cyclic, collective and anti-torque controls. Aircraft Structures: Fundamentals of structural systems, zonal and station identification, electrical bonding, lightning strike protection provision.

**ACMN 238 PROPULSION I****3.0:3 cr. E**

Constructional arrangement and operation of turbojet, turbofan, turboshaft and turboprop engines, Fundamentals: Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle, force, work, energy, velocity, acceleration, construction and operation of turbojets, turbofans, turboshafts and turboprops. Engine Performance, Inlets, Compressors, Combustion Section, Turbine Section, Exhaust, Lubricants and Fuels, Lubrication Systems, Fuel Systems, Air Systems, Starting and Ignition Systems, Engine Indicating Systems.

**ACMN 241 TURBINE AEROPLANE STRUCTURES****3.0:3 cr. E**

Airworthiness requirements for structural strength, structural classification (primary, secondary, tertiary), Zonal and station identification systems, Stress and strain, Drains and ventilation provisions, Lightning strike protection provision, Construction methods of stressed skin fuselage, Structure assembly techniques, Methods of surface protection, Airframe symmetry, Fuselage (ATA 52/53/56) Construction and pressurization sealing, Seat installation and cargo loading system, Windows and windscreen construction and mechanisms. Wings (ATA 57) construction, Stabilizers (ATA 55), Flight control surfaces (ATA 55/57), Nacelles/Pylons (ATA 54).

**ACMN 242 TURBINE AEROPLANE SYSTEMS****3.0:3 cr. E**

Air supply, Safety and warning devices, systems (ATA 31), Gyroscopic systems, Compasses, Angle of attack indication, Other aircraft system indication, Avionic systems, Electrical Power, DC power generation, AC power generation, Equipment and Furnishings (ATA 25), Cabin layout, Equipment layout, Fire Protection (ATA 26), Flight Controls (ATA 27), Fuel Systems (ATA 28), Hydraulic Power (ATA 29), Ice and Rain Protection (ATA 30), Landing Gear (ATA 32), Lights (ATA 33), Oxygen (ATA 35), Pneumatic/Vacuum (ATA 36), Water/Waste (ATA 38), On Board Maintenance Systems (ATA 45)

**ACMN 243 GAS TURBINE ENGINES II****3.0:3 cr. E**

Power Augmentation Systems, Turbo-prop Engines, Turbo-shaft Engines, Auxiliary Power Units, Power plant Installation, Fire Protection Systems, Engine Monitoring and Ground Operation, Engine Storage and Preservation.

**ACMN 244 PROPELLERS****3.0:3 cr. E**

Fundamentals, Propeller Construction, Pitch Control, Propeller Synchronization, Ice Protection, Propeller Maintenance, Storage and Preservation, Propeller Storage and Preservation.

**ACMN 245 MAINTENANCE PRACTICES III****3.0:3 cr. E**

Introduction to Pneumatic and Hydraulic Systems and their components, Single acting and double acting cylinders, 3/2way valve, 2-way valve, 4/2way valve and 5/2way valve, non-return valve, shuttle valve and AND/OR logic operation, Proximity sensors, Pressure Sequence Valve and Pressure Regulating Valve, Pressure regulation and flowrate measurement. System Design (software and hardware), Application and Troubleshooting.

**ACMN 246 AVIONICS LAB I****0.3:3 cr. E**

In addition to the introduction of measurement theory, accuracy and precision concepts, error analysis and data handling, this course includes experiments in the field of avionics designed to consolidate classroom learning and workshop skills. Experiments include Pitot-static systems, conventional navigation and communication instrumentation.

**ACMN 247 AIRCRAFT SYSTEMS****3.0:3 cr. E**

Autoflight (ATA 25), Automatic Landing Systems, Communication/Navigation (ATA 23/34), Working principles of VHF and HF communication, Electrical Power (ATA 24), Equipment and Furnishings, Flight Controls (ATA 27), Fly-by-wire systems, Instrument Systems: (ATA 31), Lights (ATA 33), Internal lights, Emergency lights, On Board Maintenance Systems (ATA 45).

**ACMN 248 PROPULSION II****3.0:3 cr. E**

Electronic engine control and fuel monitoring systems (FADEC). Engine Indicating Systems: Exhaust gas temperature/inter-stage turbine temperature systems, engine speed, engine thrust indication, engine pressure ratio, engine turbine discharge pressure or jet pipe pressure systems, oil pressure and temperature, fuel pressure, temperature and flow, manifold pressure, engine torque, propeller speed.

**ACMN 250 INDUSTRIAL TRAINING I****4 cr. E**

Minimum of six weeks' full-time work placements at an aviation maintenance approved by the department. Training programs for individual students should be agreed and approved by the department. A training report must be submitted at the end of the internship detailing the responsibilities, tasks and learnt experiences of the trainee.

**ACMN 311 LEBANESE AVIATION REGULATIONS****3.0:3 cr. E**

Lebanese Civil Aviation Safety Act, role of the Lebanese Civil Aviation Authority, Lebanese Aviation Regulations (LARS): Part I: General Provisions, Part II: Aircraft Identification, Registration and Operation, Part III: Aerodromes, Part IV: Personnel Licensing, Part V: Airworthiness, Airworthiness Standards, Flight Authority, Approved Maintenance Organizations, Amateur Built Aircraft, Aeronautical Products Distribution, Maintenance Requirements, Service Difficulty Reporting, Airworthiness Directives, Part VI: General Operating and Flight Rules, Part VII: Commercial Air Services.

**ACMN 312 HELICOPTER STUDIES I****3.0:3 cr. E**

Theory of Flight-Rotary Wing Aerodynamics, Flight Control Systems and system operation: manual, hydraulic and fly-by-wire, artificial feel, balancing and rigging. Blade Tracking and Vibration Analysis: Rotor alignment, Main and tail rotor tracking, static and dynamic balancing, vibration types, vibration reduction methods, ground resonance. Transmissions: Gear boxes, main and tail rotors, clutches, free wheel units and rotor brake.

**ACMN 313 PISTON ENGINE AEROPLANES I****3.0:3 cr. E**

Revision of the Theory of Flight, Aeroplane Aerodynamics and Flight Controls as applied to piston engine aeroplanes. Piston Engine Aeroplane Structures: classification and zonal identification, drains and ventilation provisions, system installation provisions, lightning strike protection, aircraft bonding, construction methods, surface protection, airframe symmetry. Fuselage, wings, stabilizers, nacelles and pylons. Introduction to Fatigue: Fatigue loading spectrum, impact of fatigue, aging aircraft.

**ACMN 314 MAINTENANCE PLANNING AND SCHEDULING****3.0:3 cr. E**

General outline of Production Planning and control, standard terminology, Maintenance philosophies and concepts, Planning methods and standards, Production forecasting, Materials Routing, Production methods and standards, Manpower planning, Production scheduling and control, Production performance analysis, Computer applications in aircraft maintenance engineering.

**ACMN 315 RECIPROCATING ENGINES****3.0:3 cr. E**

Fundamentals, Engine Performance, Engine Construction, Engine Fuel Systems, Injection Systems, Electronic Engine Control, Starting and Ignition Systems, Induction, Exhaust and Cooling Systems, Supercharging/Turbocharging, Lubricants and Fuels, Lubrication Systems, Engine Indication Systems, Power plant Installation, Engine Monitoring and Ground Operation, Engine Storage and Preservation.

**ACMN 320 TECHNOLOGY IN ENTREPRENEURSHIP****3.0:3 cr. E**

Understanding the difference between a small business and a startup, Identifying a good market and opportunity, Launching a startup, Developing a minimum viable product, Role of Technology, Finding the right investors, Identifying early adopters, Learn how to approach challenges and problems faced within the startup world, developing a business plan and a business model, Exit strategies.

**ACMN 321 HELICOPTER STUDIES II****3.0:3 cr. E**

Helicopter Structures: classification and zonal identification, drains and ventilation provisions, system installation provisions, lightning strike protection, construction methods, surface protection, airframe symmetry. Helicopter Systems: Air-conditioning, instruments and avionics, electrical power, equipment and furnishings, fire protection, fuel systems, hydraulic power, ice and rain protection, landing gear, lights, pneumatic/vacuum.

**ACMN 322 PISTON ENGINE AEROPLANES II****3.0:3 cr. E**

Aeroplane Aerodynamics: Sources of Aerodynamic Forces, Compressible Vs Incompressible flow, Continuity equation, momentum equation, elementary thermodynamics, isentropic flow, energy equation, Airframe Structures: Static equations, FBD, tension in multiple pulley system, moments, friction, trusses, frames and machines. Shear force and bending moment diagrams.

**ACMN 323 MAINTENANCE ORGANIZATION MANAGEMENT****3.0:3 cr. E**

This course deals with the integration of production, marketing, financial and behavioral models within the framework of an aircraft maintenance organization. The course relies on examples from the maintenance industry by examining case studies delivered through seminars and presentations of aircraft maintenance industrialists.

**ACMN 325 MODERN AVIONICS SYSTEMS****3.0:3 cr. E**

The course looks at the newly emerging technologies in aircraft navigation and communication systems. Through course work and directed research projects, it examines the development, airworthiness and safety requirements of modern equipment such as satellite navigation, ground proximity warning systems (GPWS), weather radar, traffic collision and avoidance systems (TCAS), reduced vertical separation minima (RVSM) systems

**ACMN 326 AVIONICS LAB II****0.3:3 cr. E**

This course includes experiments in the field of avionics designed to consolidate classroom learning and workshop skills. Experiments include modern navigation and communication instrumentation.

**ACMN 331 AIRCRAFT SMART MATERIALS****3.0:3 cr. E**

Fundamental properties of aircraft composite materials, performance characteristics, design considerations, maintenance practices & repair procedures. Use of composite materials in modern aircraft structures, composites materials currently in use, basic laminate design, theory behind the function and construction of a fiber laminate aircraft structure, health and safety considerations, shop practices and quality control methods, vacuum bagging and tooling, damage assessment and N.D.T. methods for detecting faults in composites laminates.

**ACMN 332 CAD/CAM****3.0:3 cr. E**

Terminology, concepts and building blocks of computer aided design and manufacture. Curve and surface display and manipulation. Data file structures and interfacing between CAD and CAM demonstrated by the manufacture of sample parts and components on CNC machine.

**ACMN 333 AIRCRAFT INTERIORS****3.0:3 cr. E**

Documentation, removal and installation of aircraft interior components. Correct work techniques including interior photography prior to removal, assessment of safety and emergency equipment. Component installation including wall materials, insulation air ducts, lighting, flooring furniture, galleys, lavatories, accessories, etc. The course also includes the fabrication techniques for aircraft interiors such as seats, window covering, curtains, floor covering and general upholstery skills as well as heavy material sewing.

**ACMN 350 INDUSTRIAL TRAINING II****4 cr. E**

Minimum of six weeks' full-time work placements at an aviation maintenance approved by the department. Training programmes for individual students should be agreed and approved by the department. A training report must be submitted at the end of the internship detailing the responsibilities, tasks and learnt experiences of the trainee.

**AVEN 212 BASIC AVIATION ENGLISH****3.0: 3 cr. E**

A combination of professional jargon and work-oriented English. Specialist vocabularies of the various tasks at various levels in the aviation field. The course aims to increase confidence in communication and develops the very specific skills described in the ICAO level 4 language profile. The main focus is on the language needed to communicate in routine and non-routine or emergency situations on the floor and during flight operations.

**AVEN 242 MAINTENANCE AVIATION ENGLISH****3.0: 3 cr. E**

Train engineers in the aviation field to write clear and concise reports which will be helpful to airlines and other operators. The course consists of a series of units which help the trainee to improve their ability to write technical reports in English. Establish comprehension of spoken and written English to a degree where non English mother tongue hanger floor and handling personnel can liaise with reasonable confidence with English speaking airline operatives concerning faults, defects etc. , in order to expedite repairs supply of spare parts etc.

**COMP 221 COMPUTER TECHNIQUES II****0.3: 1 cr. E/F**

Principles of business computing as used in modern enterprises. What-if type analysis, business charting and graphing, creating database reports, internet browsing, basic web page creation and maintenance.

# **AGRICULTURE AND FOOD TECHNOLOGY**

The mission of this program is to provide students with a multidimensional approach to local and regional agricultural and food industry practices based on value added products, labeling schemes, local production valorisation (terroir products) and professionally managed agricultural entrepreneurship.

This program enables young graduates to succeed in a highly competitive environment by providing them with required tools and know-how.

## **Objectives:**

After a few years from graduation, the graduates of the BTech programs in Agricultural Technology will be able to:

- Apply the scientific principles and technical concepts relevant to the Agriculture field in the various associated work places or to pursue graduate studies;
- Use the acquired analytical skills to develop and implement projects relevant to agricultural practices based on broad-based agricultural knowledge;
- Integrate critical thinking and problem solving skills in the various work sectors;
- Demonstrate effective leadership and management and communication skills;
- Engage and conduct research activities related to the fields of Agriculture.

## **Outcomes:**

Upon completion of the program, students will acquire knowledge and skills that enable them to:

- Acquire fundamental knowledge of agricultural systems functioning and Good Agricultural Practices (GAP)
- Identify agricultural systems problems and provide relevant short, medium and long term solutions through the use of technical and computational tools
- Acquire a deep understanding of agricultural supply chain components and interactions
- Apply the concept of food hygiene and food security along the agricultural supply chain
- Develop communication skills through the use of different communication techniques (animations, illustrations, brain storming, etc.) in order to transfer information to non-specialists in a clear and simple manner
- Acquire basic accounting and economic skills to be able to manage one's own small or medium enterprise
- Innovate and propose value added (high quality, labeled, terroir, etc.) products relevant to the local agricultural production
- Identify, design, apply an experiment then analyze the results

# **BTECH – AGRICULTURAL TECHNOLOGY**

## **SEMESTER 1**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
AGRT 219	Agricultural Orientation (Seminars)	1
BIOL 205	Principles of Human Biology	3
CHEM 208	Basic Chemistry for Public Health	3
CHEM 240	Basic Organic Chemistry	3
CSIS 218	Computer Skills for Applied Technology	1
FREN 201	Techniques de l'Expression I	3
PHYS 207	Physics for Smart Agriculture	3
<b>Total</b>		<b>17</b>

## **SEMESTER 2**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
AGRT 215	Introduction to Field Practices	1
AGRT 226	Agricultural Plant Physiology	3
AGRT 241	Introduction to Food Engineering	3
AGRT 244	Agricultural Animal Physiology	3
AGRT 262	Introduction to Biochemistry	3
CHEM 209	Basic Chemistry Lab	1
FREN 202	Techniques de l'Expression II	3
<b>Total</b>		<b>17</b>

TECH 250	Training 1	2
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## **SEMESTER 3**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
AGRT 217	Food microbiology	3
AGRT 245	Agricultural Zoology	3
AGRT 252	Soil Science	3
AGRT 274	Irrigation	3
AGRT 277	Taxonomy	3
CSPR 201	Cultural & Social Sciences 1	3
<b>Total</b>		<b>18</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
AGRT 247	Agricultural Biotechnology	3
AGRT 270	Introduction to Precision Farming	3
AGRT 278	Accounting & Finance	3
CSPR 202	Cultural & Social Sciences 2	3
LISP 200	Library Use and Research Methods	1
MATH 247	Applied Statistics	3
<b>Total</b>		<b>16</b>
TECH 350	Training 2	4

**SEMESTER 5- Sustainable Agriculture and Food Industry**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
AGRT 280	Precision Farming Workshop	1
AGRT 281	Landscape Design	3
AGRT 310	Advanced Food Industry	3
AGRT 323	Zootechnics	3
AGRT 379	Pest Control	3
CSPR 203	Cultural & Social Sciences 3	3
TECH 390	Graduation project Design	2
<b>Total</b>		<b>18</b>

**SEMESTER 6- SUSTAINABLE AGRICULTURE AND FOOD INDUSTRY**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
AGRT 334	Animal Nutrition	3
AGRT 342	Total Quality Management	3
AGRT 365	Natural and Transformed Ecosystems	3
AGRT 367	Agricultural Evaluation Tools	1
TECH 391	Graduation project implementation	2
<b>Total</b>		<b>12</b>
<b>Total credits</b>		<b>104</b>

## COURSE DESCRIPTIONS

### **AGRT215 INTRODUCTION TO FIELD PRACTICES**

**1 cr. E/F**

Students attend field sessions to experience firsthand the different technical approaches to production cycles in plant, animal and food production

### **AGRT217 FOOD MICROBIOLOGY**

**3.0: 3 cr. E/F**

This course covers basic food microbiology including organization and functioning of prokaryotes and viruses, notions of bacterial taxonomy, nutrition and bacterial growth. It also studies the basic applications of microbiological tests in food industry and their importance in a solid food security program.

### **AGRT219 AGRICULTURAL ORIENTATION (Seminars)**

**1 cr. E/F**

A series of seminars specially tailored for 1st year students, provided by specialists, entrepreneurs and professionals in the field of agriculture to show students the diversity of the job market and help them choose the adequate professional future.

### **AGRT 220 APPLIED AND GENERAL PHYSICS**

**3.0:2 cr. E/F**

This course includes the application of ionizing beams in biology, the application of electricity and electronics in optical measuring for an instrumental approach. The objective is to know the basics of physics and to understand its implications in the different fields of agriculture, to be capable of using basic equipment in physics and to know and master the specific risks of this discipline. It also includes notions of metrology, units and dimensions. Basic concepts include fluid mechanics, thermodynamics, electricity and optical studies.

### **AGRT 221 CELLULAR BIOLOGY AND HISTOLOGY**

**3.0: 3 cr.E/F**

This course covers cellular biology (organization & functioning of the eukaryote cells). It also covers the basic components of different animal tissues and how do they fit into the organs functioning.

### **AGRT 223 GENERAL CHEMISTRY**

**3.0:2 cr. E/F**

The atom, chemical links, solutions chemistry, equilibrium and kinetics, practical applications of chemistry to equilibrium and chemical kinetics. The objectives are to know the basics of chemistry to understand its implications in the different domains of agriculture. To be capable of using laboratory equipment in chemical chemistry and using chemistry experimental methods, to analyze, interpret and present obtained results.

### **AGRT 224 ORGANIC AND ANALYTICAL CHEMISTRY**

**3.0:2 cr. E/F**

Names in organic chemistry, stereochemistry, functional groups, organic synthesis and common analytical techniques in chemistry. The objective is to know the fundamental basics of organic and analytical chemistry and their use in agriculture.

### **AGRT 225 MICROBIOLOGY & IMMUNOLOGY**

**3.0:2 cr. E/F**

Basic microbiology including organization and functioning of prokaryotes and viruses, notions of bacterial taxonomy, nutrition and bacterial growth. Fundamental immunology (the immune system and its responses). Basic techniques in microbiology (culture media, sterilization techniques, observation, etc.) numbering bacterial population and immunological techniques.

### **AGRT226 AGRICULTURAL PLANT PHYSIOLOGY**

**3.0: 3 cr. E/F**

This course covers water and mineral nutrition, photosynthesis, vegetative multiplication, dormancy, germination, flowering, vernalisation, sexual reproduction, phytopathology.

**AGRT 227 APPLIED CALCULUS****3.0:2 cr. E/F**

This course includes fundamental notions concerning functions, integrals, differential calculus, probability applied to experimental biology problems. The objective is to be capable of using mathematical tools in the field of agriculture.

**AGRT 236 FIELD TRAINING 1****1.0:1 cr. E/F**

A specialized program for every structure. Local adaptation to the professional environment. Every structure defines its ability and the necessary know how to obtain this module.

**AGRT 237 ZOOLOGY****3.0:2 cr. E/F**

Studying the major categories of the animal reign especially fish, mammals, amphibians, insects, mollusques, their body composition and functioning. The course relies on intense dissectional program allowing students to get acquainted with animal autopsies.

**AGRT 238 PLANT PHYSIOLOGY****3.0: 2 cr. E/F**

Plant: Water and mineral nutrition, photosynthesis, vegetative multiplication, dormance, germination, flowering, vernalisation, sexual reproduction, phytopathology. Animal: Digestive physiology, nutrition, energetic metabolism, nitrogen, mineral and vitamin, reproduction cycle, endocrine control, notions of pathology and epidemiology, zoonosis.

**AGRT 239 MOLECULAR BIOLOGY****3.0: 3 cr. E/F**

Proteins, lipids, sugars and nucleic acid composition as a unit and as complex molecules Definition and application of molecular biology tools. Initiation to biometric techniques.

**AGRT 240 BIOTECHNOLOGIES****3.0: 2 cr. E/F**

Plant production in vitro, animal cells culture, cloning, transgenesis, applications to animal and plant production. Knowing the techniques of gene cloning, bank of genes, animal and plant transgenesis, regulations, industrial use. Mastering the techniques of genetic engineering and the techniques of in vitro culture.

**AGRT241 INTRODUCTION TO FOOD ENGINEERING****3.0: 3 cr. E/F**

This course studies the concepts of applied physics including thermodynamics, fluid mechanics, and food processing with basic notions of food industry engineering.

**AGRT243 STATISTICS AND EXPERIMENTAL DESIGN****3.0: 3 cr. E/F**

This course covers the following: Statistical parameters (mean, variance, standard variation, etc.) the second part includes central normal distribution, the third part hypothesis tests and the final part is an introduction to experimental design.

**AGRT244 AGRICULTURAL ANIMAL PHYSIOLOGY****3.0: 3 cr. E/F**

This course offers studying the functioning of major animal systems such as blood, circulation, respiration, urinary, digestive, nervous and muscular systems and the interaction between them to guarantee homeostasis.

**AGRT245 AGRICULTURAL ZOOLOGY****3.0: 3 cr. E/F**

Studying the major categories of the animal reign especially fish, mammals, amphibians, insects, mollusques, their body composition and functioning. The course relies on intense dissectional program allowing students to get acquainted with animal autopsies.

**AGRT 246 FOOD INDUSTRY ENGINEERING****3.0: 2 cr. E/F**

Notion of applied physics including thermodynamics, fluid mechanics, food processing, basic notions of food industry engineering, statistics. Applied physics, elementary notions of food processing, statistics. The aim is to know and be capable of applying the basic principles in industrial physics, thermodynamics, fluid mechanics, food processing, applied to food industry engineering.

- AGRT247 AGRICULTURAL BIOTECHNOLOGY** **3.0: 3 cr. E/F**  
Plant production in vitro, animal cells culture, cloning, transgenesis, applications to animal and plant production. Knowing the techniques of gene cloning, bank of genes, animal and plant transgenesis, regulations, industrial use. Mastering the techniques of genetic engineering and the techniques of in vitro culture.
- AGRT 250 TRAINING 1** **4 cr. E/F**  
The students should do a training that is related to Agronomy. At the end of the training the students should deliver a report that describes their work during the training period.
- AGRT252 SOIL SCIENCE** **3.0: 3 cr. E/F**  
Knowing the characteristics and constituents of soil, major national soil types and their evolution, soil water needs and plants water needs. Knowing meteorology basics, the material, its use and cost. Determining an irrigation plan and analyzing soils in order to improve their fertility and establish a fertilization plan.
- AGRT 260 ANIMAL PHYSIOLOGY** **3.0: 2 cr. E/F**  
Studying the functioning of major animal systems such as blood, circulation, respiration, urinary, digestive, nervous and muscular systems.
- AGRT 261 INTRODUCTION TO BIOCHEMISTRY** **3.0: 2 cr. E/F**  
The process of major biochemical activities in the biological world such as DNA copy and transfer to cytoplasm, protein production, photosynthesis, Krebs cycle, glycolysis, etc.  
Prerequisite: AGRT 239.
- AGRT262 INTRODUCTION TO BIOCHEMISTRY** **3.0: 3 cr. E/F**  
After studying the four categories of biomolecules (sugars, proteins, lipids and nucleic acids), students study the process of major biochemical activities in the biological world such as DNA copy and transfer to cytoplasm, protein production, photosynthesis, Krebs cycle, glycolysis, etc.
- AGRT263 DATA ANALYSIS - METHODOLOGY** **3.0: 2 cr. E/F**  
Elementary statistics, experimental approach, experimental protocols, analysis of variance, data analysis (principle of methods and use strategies). The objective is to be capable of constructing a simple experimental protocol, to realize homogeneity and conformity tests, conceiving experimental plans. Knowing regression and correlation, statistical tables statistical programs.  
Prerequisite: AGRT242
- AGRT 265 NATURAL AND TRANSFORMED ECOSYSTEMS** **2.0: 2 cr. E/F**  
Ecosystems concept, primary and secondary production, food chains, trophic dependence, biogeographical cycles, transformed ecosystems examples (agriculture, forest, agricultural landscape). The objective is to know the ecosystem concept, natural environment, analyze agrosystemic perturbation and acquire cartographic knowledge. Agrometeorology, bioclimatology, pedobiology, interaction micro-organisms / soil-plant-animal. The objective is to know the constituents and properties of the soil, know the major national types of soil and their evolution, know water in the soil, need for water in cultures, symbiosis, etc. Determine an irrigation plan, analyze soils, ameliorate the structure and the fertility of the soil, etc.
- AGRT 266 PRODUCTION MANAGEMENT 1.5. 0: 1 cr. E/F**  
The objective of this course is to enhance the knowledge of the students in the enterprise production management and make them more familiar in the economic techniques for a better production chain management. Starting from the raw materials purchased from the suppliers, to finished goods and then offered to the client.

**AGRT 267 GENETICS APPLIED TO AGRICULTURE****3.0: 2 cr. E/F**

Qualitative characteristics and genetic variability, heredity, population genetics, consanguinity, heterosis, genetic value estimation, genetic amelioration, selection method and selection program. The objective is to know the genetic diversity, evolution, mutation, migration, etc. Knowing and understanding selection programs, using technological tool in selection schemes.

**AGRT269 STATISTICS AND EXPERIMENTAL DESIGN - LAB****1.5. 0:1 cr. E/F**

Using Excel for descriptive statistics, hypothesis tests, correlation and ANOVA. Advanced Experimental design.

**AGRT270 INTRODUCTION TO PRECISION FARMING****3.0: 3 cr. E/F**

This course introduces basics of smart technologies including sensors, diodes, etc. with an emphasis on arduino technology. The second phase includes an introduction to IOT and its applications in agriculture. Projects are presented for both parts.

**AGRT 271 QUALITY - SUPPLY CHAIN****3.0: 2 cr. E/F**

Production conditions and products quality, relation between supply chain actors, “quality” approach. Knowing supply chain operators from producers to consumers. Knowing quality parameters of food products, having knowledge of the certification and legislation, knowing how to perform a flux study, being able to apply quality approach in a business (quality assurance, norms, etc.). Being able to have a “supply chain” approach. (products quality).

**AGRT 272 SOILS SCIENCE****3.0: 2 cr. E/F**

Knowing the characteristics and constituents of soil, major national soil types and their evolution, soil water needs and plants water needs. Knowing meteorology basics, the material, its use and cost. Determining an irrigation plan and analyzing soils in order to improve their fertility and establish a fertilization plan.

**AGRT 273 MANAGEMENT & DEVELOPMENT****3.0: 2 cr. E/F**

Local development, rural management, protection and management of natural space. Knowing the components of a rural landscape and their study tools, the environmental policy tools in rural regions, the organization and the functioning of different collectivities and local and regional organisms. Being able to set up a program for rural space management.

**AGRT274 IRRIGATION****3.0: 3 cr. E/F**

The course emphasizes on different irrigation techniques and calculations to be able to present solid irrigation solutions for different sorts of production systems.

**AGRT277 TAXONOMY****3.0: 3 cr. E/F**

This course covers the classification of the plant realm and the major characteristics of the taxons with special emphasis on taxons involved in agricultural production.

**AGRT278 ACCOUNTING & FINANCE****3.0: 3 cr. E/F**

This course offers elements of agricultural accounting, forecasts, predictions and investments as well as the basics of economic and management studies. It also focuses on operations of commercial banks and covers credit analysis, investment policy, liquidity, business loans and consumer and repository management regarding monetary policy.

**AGRT 279 PHYTOPATHOLOGY 3.0: 3 cr.E/F**

The content of the module and its modalities will be adapted to the path chosen by the student and to the local teaching and professional specificities. The course may cover one or more themes such as phytopathology, hygiene quality, non food agricultural production, international agricultural development and sustainable agriculture.

**AGRT280 PRECISION FARMING WORKSHOP****3.0: 1 cr. E/F**

Students learn to apply their acquired knowhow in smart agriculture and IOT in a comprehensive agricultural project.

**AGRT281 LANDSCAPE DESIGN****3.0: 3 cr. E/F**

This course allows students to study basic cartography and landscape design with a presentation of a project at the end of the course.

**AGRT 310 ADVANCED FOOD INDUSTRY****3.0: 3 cr. E/F**

This course covers the advanced food processing systems and their basic functionalities.

**AGRT 311 DETAILED BIOCHEMISTRY****3.0:2 cr. E/F**

Studying biomolecules and the physico-chemical properties and structural biochemistry. The objective is to understand how living organisms have extraordinary properties compared to the properties of inanimate matter, which constitute an organism which interacts one with another to maintain and perpetrate life.

**AGRT 312 ADVANCED FOOD INDUSTRY****3.0: 2 cr. E/F**

Studying biomolecules and the physico-chemical properties and structural biochemistry. The objective is mainly molecular biology, which is to understand the mechanisms allowing an organism to perpetrate life, which means the study of biomolecules and the study of this molecular logic of the living organism.

**AGRT 313 LAW AND LEGISLATION****1.5. 0: 1 cr. E/F**

The objective of this course is to provide detailed knowledge of the labor law, sanitary and structural legislations, as well as the taxation system. Moreover, students would acquire knowledge of environmental legislation as well as import and export legislation on the local, regional and European levels.

**AGRT 315 MICROBIOLOGY & BIOPRODUCTION****3.0: 2 cr. E/F**

The objective is to be capable to proceed in microbiological analyses, identify major plant and animal mycoses, and make viral serodiagnostics and bacterial and viral molecular identification. Using certain tests and diagnostic technologies. Understanding the processes used by microorganism to produce bioproducts for different uses.

**AGRT 316 OPTIONAL MODULE I****3.0: 2 cr. E/F**

In this module, the students can choose any course from the catalog, provided that this course has the same number of credits.

**AGRT 317 OPTIONAL MODULE II****3.0: 2 cr. E/F**

In this module, the students can choose any course from the catalog, provided that this course has the same number of credits.

**AGRT 318 INTERNATIONAL TRADING****3.0: 2 cr. E/F**

The objective is to illustrate for the students the importance of the international trading (Exportation-Importation) for the enterprise, and to notify them about the international trading risks including the transportation and the uses of different currencies, also to explain for them the techniques that protect them from these risks.

**AGRT 319 TUTORED PROJECT****3.0: 2 cr. F**

Team work of students under a tutor who would guide them in their bibliographical research, in their business reports, who would help them to learn to work independently. The objective is to know how to research, gather and analyze information, learn the multidisciplinary approach, master the oral expression and the report preparation and be prepared for a business internship.

**AGRT 320 FARM AND TERRITORIAL ANALYSIS****3.0: 3 cr. F**

The objective is to teach the students a rigorous and controllable approach capable of continuous questioning of the principles, laws and theories it elaborates. They will be capable of affirming that the scientific method is a learning system with an auto-corrective sub-system allowing it to verify the veracity, transferability and validity of the knowledge it produces. The third part's objective is to help with the choice of the techniques, methods types of researched data, the nature of information and the intended audience. Quantitative and qualitative techniques, the choice of indicators (definition, pertinence and construction). The evaluation (continuous, comparative, etc.). Use and analyze gathered data for coherence, facing the identified problematic.

**AGRT 321 TECHNICO-ECONOMICAL ANALYSIS****3.0: 2 cr. E/F**

The second part provides the basics necessary for all the courses relevant to the management of a business including management and decision process, accounting and data collection, balance sheet analysis, status and results analysis, production cost and profitability threshold, status and financial evolution analysis, technico-economic data analysis, diagnostics and potential solutions and finally, partial budget.

**AGRT323 ZOOTECHNICS****3.0: 3 cr. E/F**

This course covers all zootechnical aspects relevant to herd management including breeding, milk, eggs and meat production, heat synchronization, kids breeding, artificial insemination, housing conditions, pasturing, ... Moreover, it helps understanding basic functions of the most common animal disease causing agents. Learn how to notice the symptoms and understand the functioning and the cure of major animal diseases.

**AGRT 324 BUSINESS & PROJECT MANAGEMENT****3.0: 3 cr. E/F**

Knowledge of business problematics, different types of enterprises, stakeholders, labor law, commercial law, industrial properties, patents, balance sheet, profit, annual report, accounting, audit, etc. The development of capitalism and industrialization, their critics (Marxism, environmentalists etc.). Management, hierarchy, human resources, salary negotiations, objectives evaluation, etc. The objective of this course is to allow students identify business objectives, perform relevant planning and set proper short, medium and long term policies to reach these objectives be it on the financial, environmental, or productivity level, and to be able to evaluate the evolution of a business compared to these objectives. Setting a project, identifying needed resources and time, preparing a detailed timeline. Following up with each actor in order to respect the set timeline, organizing work and distributing tasks and performing collective elaboration to deliver a determined project within the indicated time frame according to the identified characteristics, using the available resources.

**AGRT 325 SUSTAINABLE DEVELOPMENT****3.0: 3 cr. E/F**

Properly using different diagnostic tools to identify weaknesses of agricultural production systems and transform these results into simply transferable information, understandable by non-specialists. The aim is to provide proper advice for stakeholders involved in sustainable agricultural and rural development.

**AGRT 326 SOCIO-ECONOMIC DEVELOPMENT****3.0: 2 cr. E/F**

The objective of this course is to allow students identify business objectives, perform relevant planning and set proper short, medium and long term policies to reach these objectives be it on the financial, environmental, or productivity level, and to be able to evaluate the evolution of a business compared to these objectives.

General review of the laws and regulations governing the hygienic, environmental, labor and commercial facets. Financial analysis, preparing budgets, understanding financial reports and balance sheets. Setting marketing strategies, understanding consumers needs and performing SWOT analysis. Understanding the basics of import and export activities and relevant regulations.

**AGRT 327 DIAGNOSTICS & ANALYSIS****3.0: 2 cr. E/F**

The objective is to teach the students a rigorous and controllable approach capable of continuous questioning of the principles, laws and theories it elaborates. They will be capable of affirming that the scientific method is a learning system with an auto-corrective sub-system allowing it to verify the veracity, transferability and validity of the knowledge it produces. The objective of this course is to help with the choice of the techniques, methods types of researched data, the nature of information and the intended audience. Quantitative and qualitative techniques, the choice of indicators (definition, pertinence and construction). The evaluation (continuous, comparative, etc. ). Use and analyze gathered data for coherence, facing the identified problematic.

**AGRT 328 QUALITY CONTROL****3.1: 3 cr. E/F**

Experimenting system analysis processes, evaluation, knowing the criteria to choose a system analysis method for explanatory or decisional means. Studying the methods and instruments allowing to measure the performance of production systems or businesses. Elaborating and applying a score board for management and quality charters.

Knowing and performing different tests relevant to milk and dairy products including, hygienic and qualitative tests, such as bacterial count, antibiotic presence, dry matter percentage, fat content, cheese consistency and structure as well as the use of additives, starters, etc.

Prerequisite: AGRT 271

**AGRT 329 BUSINESS KNOWLEDGE****3.0: 3 cr. E/F**

The aim of this course is to allow students perform proper diagnostics of the needs of an agricultural sub-sector and set relevant projects to cater for these needs in a lucrative and sustainable manner.

**AGRT 330 COMPUTER TOOLS****1.5. 0: 1 cr. E/F**

Mastering the use of different computer tools, including internet research as well as other Microsoft programs for data analysis, reports preparation and presentation preparation as well as information sharing on the web using blogs and social media.

**AGRT 331 TUTORED PROJECTS****3.0: 2 cr.E/F**

Team work of students under a tutor who would guide them in their bibliographical research, in their business reports, who would help them to learn to work independently. The objective is to know how to research, gather and analyze information, learn the multidisciplinary approach, master the oral expression and the report preparation and be prepared for a business internship.

**AGRT 332 QUALITY DEVELOPMENT****3.0: 3 cr. E/F**

Mastering biochemistry and applied physico-chemistry as well as food microbiology, food analysis, bioproduction, applied genetics in order to become capable of applying them to food industries. Experimenting system analysis processes, evaluation, knowing the criteria to choose a system analysis method for explanatory or decisional means. Studying the methods and instruments allowing to measure the performance of production systems or businesses. Elaborating and applying a score board for management and quality charters.

**AGRT 333 BIOLOGICAL ENGINEERING****3.0: 2 cr. E/F**

Mastering biochemistry and applied physico-chemistry as well as food microbiology, food analysis, bioproduction, applied genetics in order to become capable of applying them to food industries

**AGRT334 ANIMAL NUTRITION****3.0: 3 cr. E/F**

Studying different feeding systems, intensive and extensive systems, pasturing, rotation, etc. Preparing feeding rations according to the animal life cycle (growth, pregnancy, milking period, laying hens, etc.

**AGRT 340 ENTOMOLOGY****3.0: 2 cr.E/F**

Ensuring the development of a business or an agricultural exploitation in a sustainable manner on the three levels (economic, social and environmental). Moreover, students would be able to perform relevant diagnostics of the status of sustainability, its dynamic evolution and ways to improve the sustainability compared to specific benchmarks.

**AGRT 342 TOTAL QUALITY MANAGEMENT****3.0: 2 cr. E/F**

Knowing and understanding quality parameters of food production and agriculture supply chain. Mastering quality certification and legislation processes and being able to apply a quality approach in a business (quality assurance, norms)

**AGRT 343 MARKETING, PACKAGING & CONDITIONING****3.0: 2 cr. E/F**

The objective of this course is to identify a product's strengths and become capable of highlighting them in order to increase attractiveness to the consumer. Applying the best packaging characteristics to serve the products attractiveness for the consumers and have the needed knowledge to adapt the characteristics of a certain product to serve the consumers' expectations.

**AGRT 345 ORGANIZING, PRODUCTION MANAGEMENT - PLANNING****3.0: 3 cr. E/F**

Applying efficient time and resources management, organizing the work of different teams relevant to different facets or steps in a project. Planning and setting proper timelines, making sure deadlines are respected and using innovative solutions whenever delays are caused.

**AGRT 350 TRAINING II****4 cr.**

The students should do a training that is related to Agronomy. At the end of the training the students should deliver a report that describes their work during the training period.

**AGRT365 NATURAL AND TRANSFORMED ECOSYSTEMS****3.0: 3 cr. E/F**

Ecosystems concept, primary and secondary production, food chains, trophic dependence, biogeographical cycles, transformed ecosystems examples (agriculture, forest, agricultural landscape). The objective is to know the ecosystem concept, natural environment, analyze agrosystemic perturbation and acquire cartographic knowledge. Agrometeorology, bioclimatology, pedobiology, interaction micro-organisms / soil-plant-animal. The objective is to know the constituents and properties of the soil, know the major national types of soil and their evolution, know water in the soil, need for water in cultures, symbiosis, etc. Determine an irrigation plan, analyze soils, ameliorate the structure and the fertility of the soil, etc.

**AGRT367 AGRICULTURAL EVALUATION TOOL****1 cr. E/F**

Properly using different diagnostic tools to identify weaknesses of agricultural production systems and transform these results into simply transferable information, understandable by non-specialists. The aim is to provide proper advice for stakeholders involved in sustainable agricultural and rural development.

**AGRT 379 PEST CONTROL****3.0: 3 cr. E/F**

This course includes the basics of phytopathology and their application in agriculture and pest control.

# **MANAGEMENT AND ADMINISTRATION TECHNOLOGY**

The mission of the Bachelor of Technology in Management and Administration Technology (MAT) is to prepare graduates for management, human resources, marketing and sales or administrative positions in a wide variety of business settings and organizations. It allows them to succeed in a highly competitive environment by providing them with required tools and know-how for problem solving and analytical thinking.

## **Objectives**

After a few years of graduation, the graduates of the BTech programs in BMAT will be able to:

- Apply the fundamentals of management and supervision in the practice of market place, or to pursue graduate education;
- Succeed to implement the concepts of project management and play a major role therein;
- Apply proper interpersonal and communication skills to be productive members in a teamwork environment, and to act professionally and ethically.
- Engage in professional growth and lifelong development activities, and apply critical thinking in addressing emerging issues related to the disciplines of their education.

## **Outcomes**

Upon completion of the program, students will acquire knowledge and skills that enable them to:

- Acquire analytical and problem solving skills in accounting, economics, finance, management and marketing.
- Acquire the communication, research and technological skills to analyze a business situation (problem and/or opportunity) and prepare and present an adequate solution.
- Analyze and set up business strategies, practices, and theories that inform and guide organizations.
- Develop a marketing plan for a new or existing product or service.
- Demonstrate an understanding of the principles of accounting in order to ensure alignment with organizational goals and strategies.
- Devise a capital budgeting strategy.
- Devise planning and control activities to effectively produce and deliver goods and services.

# **BTECH MANAGEMENT & ADMINISTRATION**

## **SEMESTER 1**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 212	Financial Accounting 1	3
BUST 213	Microeconomics	3
BUST 217	Principles of Management	3
CSIS 218	Computer Skills for Applied Technology	1
ENGL 203	English Communication Skills III	3
MATH 209	Applied Business Mathematics	3
<b>Total</b>		<b>16</b>

## **SEMESTER 2**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 221	Financial Accounting 2	3
BUST 231	Macroeconomics	3
BUST 233	Business Law	3
BUST 242	Entrepreneurship & Business Establishment	2
ENGL 2xx	English Elective	3
Elective	BUST240, BUST243	1
<b>Total</b>		<b>15</b>

TECH 250	Training I	2
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## **SEMESTER 3**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 228	Principles of Marketing	3
BUST 234	Financial Analysis	3
BUST 239	Business Idea and Business Planning	1
BUST 241	Cost Management & Analysis	3
CSPR 201	Cultural & Social Sciences 1	3
MATH 247	Applied Statistics	3
MATH 250	Applied Statistics Laboratory	1
<b>Total</b>		<b>17</b>

## **SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 237	Ethics in Business & Management	3
BUST 246	Management Control & Dashboard	3
BUST 344	Financial Management	3
BUST 349	Research Methods	2
CSPR 202	Cultural & Social Sciences 2	3
Elective	BUST220, BUST340, BUST346	2
LISP 200	Library Use and Research Methods	1
<b>Total</b>		<b>17</b>

TECH 350	Training II	4
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**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 238	Business Feasibility Study	1
BUST 351	Human Resources Management	3
BUST 374	Total Quality Management	3
CSPR 203	Cultural & Social Sciences 3	3
Elective	BUST348, BUST353, or BUST357	3
TECH 390	Graduation Project Design	2
<b>Total</b>		<b>15</b>

**SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 370	Project Management Techniques	1
BUST 375	Managing International Finance	3
BUST 376	Human Relations	2
Elective	BUST359, BUST360, or BUST369	3
Elective	BUST381, BUST382, MATH261, or BUST358	3
Elective	BUST 305 or BUST308	2
TECH 391	Graduation Project Implementation	2
<b>Total</b>		<b>16</b>
<b>Total credits</b>		<b>102</b>

**ELECTIVES**

**SEMESTER 2:**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 240	Accounting Practices and Application	1
BUST 243	Management Practices and Application	1

**SEMESTER 4:**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 220	Fundamentals of Management and Economics	2
BUST 340	Supply Chain and Logistics Management	2
BUST 346	Taxation and VAT	2

**SEMESTER 5:**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 348	Consumer Behavior	3
BUST 353	International Trade	3
BUST 357	Business Evaluation	3

**SEMESTER 6:****ELECTIVES 1:**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 359	Sales Management	3
BUST 360	Banking & Finance	3
BUST 369	Strategic Management	3

**ELECTIVES 2:**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 358	Principles of E-commerce	3
BUST 381	Retail & Wholesale Marketing	3
BUST 382	Digital Marketing	3
MATH 261	Business Operation Research	3

**ELECTIVES 3:**

<b><u>Course Code</u></b>	<b><u>Course</u></b>	<b><u>Credit</u></b>
BUST 305	Trading in international financial management	2
BUST 308	Digital tools for modern entrepreneur	2

## COURSE DESCRIPTIONS

### **BUST 211 APPLIED BUSINESS MATHEMATICS**

**3.0: 3 cr. E/F**

This course focuses on the Study of unvaried and multivariate functions, differential equations and linear modeling Systems, matrix and diagonalization and dynamic systems.

This course examines the short-term financial transactions as calculating simple interest, discount, equivalence of capital, and the long-term financial transactions as compounded interest calculation and discount, annuities, amortization borrowing and investment profitability.

### **BUST 212 FINANCIAL ACCOUNTING 1**

**3.0: 3 cr. E/F**

This course covers techniques of recording, classifying and summarizing financial information. More particularly, it focuses on detailed understanding of accounting information systems, accounting concepts, accounting principles, accounting cycle, recording of transactions, and financial statement concepts. Besides, topics covered include operating profits and business activities in relation to current assets such as cash, receivables and stocks.

### **BUST 213 MICROECONOMICS**

**3.0: 3 cr. E/F**

This course represents the general principles of microeconomics analysis. It attempts to understand interactions between individual consumers and firms. We focus on the detailed study of these agents' behavior themselves, by using mathematical techniques. Topics include (1) elements of supply and demand, (2) consumer behavior, (3) production and costs, and (4) market equilibrium (competition).

### **BUST 217 PRINCIPLES OF MANAGEMENT**

**3.0: 3 cr. E/F**

This is a Management complementary course covering the principles of management. The course introduces the student to the management functions (planning, organization and management) and their implementation, in addition to the application for today's Business Environment.

### **BUST 220 FUNDAMENTALS OF MANAGEMENT AND ECONOMICS**

**2.0: 2 cr. E/F**

This course is organized to contain two major parts: Functions of engineering management, and Economic fundamentals for engineering managers. Part one introduces the basic functions on engineering management such as planning, organizing, leading and controlling, while part two covers the fundamentals of engineering economics.

### **BUST 221 FINANCIAL ACCOUNTING 2**

**3.0: 3 cr. E/F**

This course covers the accounting for tangible and intangible assets and related depreciation and amortization. It also covers partnerships and corporations, including the corresponding section of equity, payable bonds and statement of cash flows. The generally accepted accounting principles and analysis of financial statements are also covered.

Prerequisite: BUST212

### **BUST 223 ANALYTICAL ACCOUNTING**

**3.0: 3 cr. E/F**

This course prepares students for managerial role in the decision-making process; especially the concepts and principles that are the basis for the development of cost information. Topics covered include: processing labor control systems, profitability analysis, analysis of variance, cost behavior, relevant costs, standard costs, budgeting for standards, cost control and optimization. Emphasis will be placed on the methods by which an accountant can analyze and solve problem areas in management.

Pre-requisite: BUST 212.

**BUST 224 STATISTICS AND PROBABILITIES****3.0: 3 cr. E/F**

This course emphasizes the use of Business quantitative methods as a tool to make well-adapted decisions. Topics include: the general introduction to the meaning, role and types of statistics and statistical data, descriptive measures, statistical inference, analysis of variations and multiple regression.

Prerequisite: BUST211

**BUST228 PRINCIPLES OF MARKETING****3.0: 3 cr. E/F**

This course prepares students for the Marketing Mix with the evolution of the marketing concept, segmentation and positioning, strategic decisions involving product, price, promotion and distribution of important environmental variables affecting marketing decisions, as well as action plan and business control.

**BUST 231 PRINCIPLES OF MACROECONOMICS****3.0:3 cr. E/F**

This course teaches students the basic tools of macroeconomics and applies them to real world economic policy. The goals are to (1) understand how to evaluate macroeconomic conditions such as unemployment, inflation, and growth - what can be learned from National Accounts (2) understand how monetary policy and fiscal policy can be used to influence short-run macroeconomic conditions. The course will be structured around the classical models of macroeconomics, using primarily graphs and occasionally equations..

**BUST 232 ADVANCED ACCOUNTING****3.0:3 cr. E/F**

This course covers the particular economic or legal situations. The analysis is based on fundamental accounting principles set forth by the PCG on the rules of accounting and accounting solutions doctrinal depth strives to translate complex situations in the light of the rules of accounting. It covers the concept of groups with the development of consolidated financial statements, according to the principles of consolidation in accordance with the international countable standards (IAS/IFRS). Finally, this course makes it possible to the participants to take note of the international harmonization on the accounts of the companies, as implemented by the International Accounting Standards Board (IASB).

Prerequisite: BUST 221

**BUST 233 BUSINESS LAW****3.0: 3 cr. E/F**

This course prepares students for a study of the Lebanese legal system. Topics include: basic elements of contract law, negligence and product liability, property laws such as mortgages, landlord, tenant and personal properties, goodwill, modes of structure of the company: single owner, companies and co-operatives, financing and sale, bankruptcy, insolvency and dissolution of the company.

**BUST 234 FINANCIAL ANALYSIS****3.0: 3 cr. E/F**

This course provides students with an overview of the techniques and procedures used to extract relevant information from financial statements and interpret them to extract valuable information about the state of health of a company and its development potential. Topics covered include: restatement of an accounting balance sheet, financing table, restructuring of the income statement in the form of interim management balances, activity and margin ratios, leverage, analysis financial structure and development potential with profitability.

Prerequisite: BUST212 & BUST221

**BUST 237 ETHICS IN BUSINESS & MANAGEMENT****3.0: 3 cr. E/F**

It is an introductory course covering the basic principles of management, including the goal of putting technical, operational planning and control processes. The course will introduce the student to the management functions (planning, organization and management) and their implementation. The ethical principles are also highlighted with all moral problems that could arise in a business environment.

**BUST 238 BUSINESS FEASIBILITY STUDY****0.3: 1 cr. E/F**

This course covers techniques of leading a feasibility study. In particular, it involves analyzing the viability and economic and organizational implications of a project (business creation, deployment of a new facility, launch of a new product). Topics covered include: a- Evaluation of the idea and analysis of the project's needs, b- The criteria for pursuing or abandoning a business idea (management capacity, technical realities, market realities, financial realities, risk realities, profitability criteria), c- Planning and its efficiency, d- market research, business plan development, SWOT matrix, e- Funding sources.

**BUST 239 BUSINESS IDEA AND BUSINESS PLANNING****0.3: 1 cr. E/F**

One of the most exciting and satisfying activities in business is to start a new venture. In this course students will learn how to prepare a comprehensive strategy for launching a new business. The vehicle for achieving this is the preparation of a business plan based on an opportunity that students have selected. Working in small teams, students will have the opportunity to apply their entire business education and experience to a very practical project taking a hands-on approach. In this course students are expected to interact with the business community, be able to work effectively in teams, and be active participants in classroom discussions.

**BUST 240 ACCOUNTING PRACTICES AND APPLICATION****0.3: 1 cr. E/F**

This course covers techniques of analyzing, classifying, and recording business transactions in computerized setting: payroll tax procedures, taxing entities, and reporting requirements of local taxing authorities in a computerized environment. Prerequisite: BUST212

**BUST 241 COST MANAGEMENT & ANALYSIS****3.0: 3 cr. E/F**

This course prepares students for managerial roles in the decision-making process; especially the concepts and principles that are the basis for the development of cost information. Topics covered include: processing labor control systems, profitability analysis, analysis of variance, cost behavior, relevant costs, standard costs, budgeting for standards, cost control and optimization. Emphasis will be placed on the methods by which an accountant can analyze and solve problem areas in management.

**BUST 242 ENTREPRENEURSHIP & BUSINESS ESTABLISHMENT****2.0: 2 cr. E/F**

The course develops the analytical abilities and strategic competencies necessary to nourish a business idea into the making. Students are accompanied through a simulation project at all phases of the process in order to create a creative and innovative business. Pre requisite: BUST217

**BUST 243 MANAGEMENT PRACTICES AND APPLICATION****0.3: 1 cr. E/F**

This course prepares students for managerial techniques of analyzing and developing business strategies in technology-based industries. They will learn how implement the company's operations for that company's ability to achieve its organizational mission and to deliver a financial return through a computerized environment. Prerequisite: BUST217

**BUST 246 MANAGEMENT CONTROL & DASHBOARD****3.0: 3 cr. E/F**

This course provides an overview of procedures and recommendations which ensure the sustainability of the capital, the quality of information and the improvement of an organization's performance. Students will acquire all concepts, methodologies and tools needed for an internal audit so as to identify and evaluate managerial risks.

Prerequisite: BUST241

**BUST 250 TRAINING I****4 cr. E**

The students should do a training that is related to business or finance. At the end of the training the students should deliver a report that describes their work during the training period.

**BUST 305 TRADING IN INTERNATIONAL FINANCIAL MANAGEMENT** **2.0: 2 cr. E/F**

The purpose of this course is to introduce students to the practice of trading in financial markets with data and tools used by practitioners. The objectives of this course: 1) to become familiar with the stock market profession; 2) understand the role played by macroeconomic indicators in investment decision making; 3) apply the main tools needed to analyze financial information in order to execute the three types of financial transactions (arbitrage, speculation, and hedging); 4) acquire notions on the psychology of the investor and the financial markets. The sessions take place in a virtual trading room.

**BUST 308: DIGITAL TOOLS FOR MODERN ENTREPRENEUR** **2.0: 2 cr. E/F**

This course will introduce the most important digital tools nowadays that can support an entrepreneur in developing his idea and executing operations. Instead of investing in a high cost infrastructure office, he can benefit from the current gears and improve his business performance.

**BUST 340 SUPPLY CHAIN AND LOGISTICS MANAGEMENT** **2.0: 2 cr. E/F**

This course explores the key issues associated with the design and management of industrial Supply Chains (SC). SC are concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total supply chain cost subject to various service requirements. Students will be able to describe and explain fundamentals of SC and to derive and compute optimal policies/variables, performance measures such as costs/profits, and be aware of SC practices.

Prerequisite: BUST217, BUST228

**BUST 342 INTERNATIONAL STANDARDS IAS-IFRS** **3.0: 2 cr. E/F**

This course covers the following topics: Major causes of international differences, international classification of accounts, harmonization and International Financial Report Standards, diversity report and financial practices across a variety of countries.

Prerequisite: BUST 232.

**BUST 344 FINANCIAL MANAGEMENT** **3.0: 3 cr. E/F**

The course gives key financial principles for a feasibility study. Topics covered include: (1) Methods in Evaluating Profitability of Investment projects in certain and uncertain environments (2) Approaches to estimate Risk and cost of capital.

Prerequisite: MATH209, BUST234

**BUST 346 TAXATION AND VAT** **2.0: 2 cr. E/F**

This course aims to prepare students for the challenges facing tax payers and tax managers in Lebanon and abroad. The topics treated include: tax regulations and their application to individuals and companies in a variety of conditions, the impact of taxation on business decisions.

**BUST 347 BUSINESS OPERATION RESEARCH** **3.0: 2 cr. E/F**

This course uses general mathematic methods in addressing topics in Business. The pervasive underpinning of this course is managerial decision making in a business environment by using basic tools of Operations Research. Managerial decisions cover labor negotiation, litigation, pricing, and similar topics, with an emphasis on optimal choices and how to restructure situations to encourage optimal outcomes for all parties.

**BUST 348 CONSUMER BEHAVIOR** **3.0: 3 cr. E/F**

Consumer behavior is one of the most critical and important subtopics of marketing. Consumer behavior: the study of the processes involved when individuals or groups select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desires. This course covers the buyer decision process as well as the main external and internal stimuli affecting consumers in their decisions to buy.

Pre-requisite: BUST228.

**BUST 349 RESEARCH METHODS****2.0: 2 cr. E/F**

In this course, the student will be able to select a research topic, conduct initial research to develop appropriate problem statements, research questions, and hypotheses so that an appropriate research method can be selected. The student will also be able to develop a literature review and a research methodology based on the selected topic. The course is structured around two main axes: (1) define the steps and methods of the scientific investigation; (2) identify steps involved in writing a thesis or in a research paper.

**BUST 350 TRAINING II****4 cr. F**

The students should do a training that is related to business or finance. At the end of the training the students should deliver a report that describes their work during the training period.

Pre-requisite: BUST 250.

**BUST 351 HUMAN RESOURCES MANAGEMENT****3.0: 3 cr. E/F**

An analysis of policies and practices relating to subcontract analysis, human resource planning, staffing, performance evaluation, training and development, wage and salary administration and collective labor agreement.

**BUST 352 MANAGEMENT CONTROL & BUDGET****3.0: 3 cr. E/F**

This course provides an overview of procedures and recommendations which ensure the sustainability of the capital, the quality of information and the improvement of an organization's performance. Students will acquire all concepts, methodologies and tools needed for an internal audit so as to identify and evaluate managerial risks.

**BUST 353 INTERNATIONAL TRADE****3.0: 3 cr. E/F**

This course provides a background in international economics, covering historical development of international trade theories from Mercantilisms, Adam Smith, and David Ricardo to today in an attempt to understand what macroeconomic and microeconomic effects trade has on an economy. The course is designed to serve this level and as a preparation for further study of both applied international economics and advanced international trade theory.

**BUST 354 INTERNATIONAL FINANCE****3.0: 3 cr. E/F**

International Finance is an advanced course in economics. It surveys a variety of topics in international finance and open-economy macroeconomics, including: the national balance of payments, the foreign exchange market, exchange rate determination, Purchasing Power Parity, and the evolving International Monetary System. The course will also discuss various recent policy debates.

Prerequisite: BUST 213, 231.

**BUST 356 BUSINESS & HEALTH EDUCATION****3.0: 3 cr. E/F**

This course is designed to help students achieve a high level of wellness, prevent disease and offer ways to maximize both their personal lifestyles and their environments. The various factors influencing current and future levels of wellness will be addressed as well as information that will include, but not be limited to: mental health, stress management, nutrition, weight control, fitness, addictive substances, and disease. The students will also be introduced to the Lebanese health system and its role in society.

**BUST 357 BUSINESS EVALUATION****3.0: 3 cr. E/F**

Topics covered include: risk and cost of capital, the principles and methods of asset management and planning and control for the accomplishment of both short and long term objectives.

**BUST 358 PRINCIPLES OF E-COMMERCE****3.0: 3 cr. E/F**

This course deals with the basic concepts of E-Commerce, including events related to laws and regulations.

Prerequisite: BUST228

**BUST 359 SALES MANAGEMENT****3.0: 3 cr. E/F**

The goal of the Sales Management course is to examine the elements of an effective sales force as a key component of the organization's total marketing effort. Sales management examines the preparation of the student's understanding of marketing's reach and potential impact in achieving its overarching goals.

**BUST 360 DIGITAL MARKETING****3.0: 3 cr. E/F**

The course provides students with a fundamental understanding of the financial system and explores the connection between financial markets, financial institutions and the economy. It also gives an introduction to risk management and behavioral finance principles. The first part of the course defines the role and functions of financial markets, types of Capital Market, types of Instruments traded in Capital Market, the banking system, the stock market mechanisms. The second part explains Valuation Methods of stocks and bonds and provide a broad introduction to portfolio management.

Prerequisite: MATH209, BUST231.

**BUST 362 BANKING & FINANCE****2.0: 2 cr. E/F**

The course will provide students with a fundamental understanding of the financial system and explore the connection between financial markets, financial institutions and the economy. It also gives an introduction to risk management and behavioral finance principles to understand the functioning of securities, insurance, and banking industries.

The first part of the course is indented to define the role and functions of financial markets, the types of financial actors, the term structure of interest rates, stock market mechanisms, principals of derivatives, and currencies. The second part gives an overall summary of financial institutions, in particular commercial banks, investment banks, insurance companies, mutual funds, the Federal Reserve Systems and their role in the economy.

Prerequisite: BUST 213, 231.

**BUST 363 AUDIT****2.0: 2 cr.E/ F**

This course defines the role of audit in business. Verification of balance sheet, the profit and loss account on the basis of internal control, declaration standards, auditing principles and legal liability are covered.

Prerequisite: BUST 221, 342.

**BUST 364 BUSINESS QUANTITATIVE TECHNIQUES (SPSS)****1.5. 0: 1 cr. E/F**

This course presents descriptive statistics, modeling and forecast from a managerial point of view.. The chapters consider issued problems and outcomes. This course requires a theoretical and practical methodology based on the use of EXCEL and SPSS (Statistical Package for the Social Science).

Prerequisite: BUST 227.

**BUST 369 STRATEGIC MANAGEMENT****3.0: 3 cr. E/F**

This course allows students to identify and describe the strategies that managers can carry on so as to achieve better performance and competitive advantages for an organization. It will treat the following concepts: Strategy, definitions and features, strategic management process, environmental scanning, strategy formulation, strategy evaluation, strategic decisions, strategic leadership, corporate governance and core competencies.

Prerequisite: BUST217.

**BUST 370 PROJECT MANAGEMENT TECHNIQUES****0.3: 1 cr. E/F**

This course will assist the project manager to break down a complex project into manageable segments, lead a diverse project team, and use effective tools to ensure that the project meets its deliverables and is completed within budget and on schedule. Over the course students will complete a plan for an actual project, giving them valuable experience with the relevant tools and skills, including Microsoft Project software.

Prerequisite: BUST217

**BUST 371 SAFETY PROGRAM FOR SME****3.0: 3 CR. E/F**

The main objective of this course is to equip students with the key concepts and methods of Employer and employee involvement and communication on workplace-safety and health issues are essential, and to allow them to understand how to apply those tools to solve real-life business problems. This course focuses equally on (i) technical competence and (ii) application to real-life problems. It covers the technical aspects of the company's written safety and health policy for all to see. The other important element of this course is the involvement of all employees in policy making on safety and health issues.

**BUST 372 SUPPLY CHAIN MANAGEMENT****3.0: 3 cr. E/F**

This course explores the key issues associated with the design and management of industrial Supply Chains (SC). SC are concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. One of the primary objectives of SC management is to minimize the total supply chain cost subject to various service requirements. Students will be able to describe and explain fundamentals of SC and to derive and compute optimal policies/variables, performance measures such as costs/profits, and be aware of SC practices.

Prerequisite: BUST 217, 228.

**BUST 374 TOTAL QUALITY MANAGEMENT****3.0: 3 cr. E/F**

In today's fast paced environment, customers are more demanding and the competition more intense. Delivering quality products and services is more crucial than ever for survival and long-term success. This course will identify the structure and requirements of an effective Quality Management System (QMS) and what this means for you. Students will gain a thorough understanding of the history and development of ISO 9001:2015, key terms, definitions and the ISO standardized high level structure.

**BUST375 MANAGING INTERNATIONAL FINANCE****3.0: 3 cr. E/F**

The bachelor's degree course in Managing International Finance aims to develop theoretical and practical competencies on the financial side of an open economy. Topics include Balance of Payments, foreign exchange market, Purchasing Power Parity theory, BOP Adjustment process, and International Monetary System. It also investigates the causes, effects and resolutions of international financial crises. The course is complemented with practical assignments and simulations, given in "Trading in International Financial Management course BUST305"

Prerequisite: BUST231.

**BUST 376 HUMAN RELATIONS****2.0: 2 cr. E/F**

This course covers techniques of developing one's sense of human relations. In particular, it emphasizes on detailed understanding of the interactions that individuals have in a society and the individual and intellectual development of each, as it is through these links that societies are made up, and on the requirements to properly perceive the needs of the other and the techniques to communicate adequately with the other while being open, flexible and adaptable. Topics covered include: a- Theories of human relationships (social man, the development of human relationships and the factors that influence man at work), b- Systemic analysis of organizations: contingency theory and contingency factor analysis, organization theory, corporate influences), c- The importance of communication within the company (techniques, forms and barriers to communication), d- The basic needs of human beings.

**BUST 381 RETAIL AND WHOLESALE MARKETING****3.0: 3 cr. E/F**

This course allows the students to get along with retailing and wholesale management, marketing channels, and retailing organizations. It sheds the light on the methods of operation, store location, trends in retail and wholesale Marketing.

**BUST 382 DIGITAL MARKETING****3.0: 3 cr. E/F**

This course examines how digital tools, such as the Internet, smartphones, and 3D printing, and many other digital tools are revolutionizing the world of marketing by shifting the balance of power from firms to consumers and making organizations vulnerable and dynamic to the ongoing change.

# **CIVIL AND CONSTRUCTION TECHNOLOGY**

The Bachelor of Technology in “Civil and Construction” covers all stages of the design and implementation of structures. The purpose of the program is to prepare students for successful careers in civil technology, from the design of structures to their construction, monitoring and maintenance. The Bachelor also prepares students to work in a multidisciplinary environment immediately after graduation.

The program in Civil and Construction technology offers opportunities for expertise in one of two tracks:

1. Green Building
2. Water Treatment and Networks

The fundamental Civil Technology courses are common for both tracks and provide a broad knowledge of the main fields of civil engineering.

## **Objectives:**

The educational objective of the Civil and Construction Technology program is to train students to support civil engineers in structural design, public works, construction, inspection, road design, environmental engineering, water treatment and networks.

Graduates in Civil and Construction Technology can:

- Be in charge of the execution, monitoring and management of on-site operations.
- Participate in the organization, execution and analysis of experimental programs in testing laboratories.
- Function and communicate effectively within a professional team.
- Engage in learning throughout their careers through their professional development and opportunities to continue their studies in graduate studies.

## **Outcomes:**

Graduates of the Bachelor in Civil and Construction Technology will have demonstrated the following capacities:

- Ability to select and apply modern knowledge, skills, tools and techniques to civil technology activities.
- Ability to perform standardized field and laboratory tests on civil & construction materials.
- Ability to plan, prepare and use design, construction and operating documents, such as specifications, contacts, change orders, engineering drawings and construction schedules.

The “Green Building” track allows students to:

- acquire professional standards engaged in construction technology of green buildings.
- improve the practice of green building engineering by involving professional instructors in an ongoing professional development program.
- have a wide knowledge of the principles and practices of disciplines and laws related to the engineering of green buildings.

The “Water treatments and networks” track allows students to:

- have an award-winning and up-to-date technical training opportunity that will open the doors for them to a career that meets the needs of the market in water sector.
- learn in a practical way the different techniques of water treatment (drinking, waste), maintenance of equipment such as pumps and valves.
- acquire multidisciplinary skills directly applied to the management and supervision of water utilities.

# **BTECH – CIVIL & CONSTRUCTION TECHNOLOGY** **(GREEN BUILDING TRACK)**

## **SEMESTER 1**

<u><b>Course Code</b></u>	<u><b>Course Title</b></u>	<u><b>Credit</b></u>
CIVT 211	Statics	3
CIVT 225	Applied Geology	3
CSIS 218	Computer Skills for Applied Technology	1
ENGL 203	English Communication Skills III	3
MATH 200A	Calculus I for Technology	3
MATH 211	Linear Algebra	3
<b>Total</b>		<b>16</b>

## **SEMESTER 2**

<u><b>Course Code</b></u>	<u><b>Course Title</b></u>	<u><b>Credit</b></u>
CIVT 223	Mechanics of Materials	3
CIVT 224	Technical Drawing 1	1
CIVT 234	Workshop Technologies	1
CIVT 312	Construction Materials & Methods	3
CSIS 206	Principles of Programming	3
ENGL 2xx	English Elective	3
MATH 202	Calculus II	3
<b>Total</b>		<b>17</b>

TECH 250	Training I	2
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## **SEMESTER 3**

<u><b>Course Code</b></u>	<u><b>Course Title</b></u>	<u><b>Credit</b></u>
CIVT 233	Theory of structures 1	3
CIVT 235	Plumbing and Electrical Installation	3
CIVT 242	Topography and Surveying	2
CIVT 243	Soil Mechanics & Foundation	3
CIVT 247	Topography and surveying Lab	1
CIVT 248	Soil Mechanics Lab	1
CSPR 201	Cultural & Social Sciences 1	3
LISP 200	Library Use and Research Methods	1
<b>Total</b>		<b>17</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
BUST 220	Fundamentals of Management and Economics	2
CIVT 240	Introduction to Geographic Information systems	1
CIVT 246	Strength of Materials Lab	1
CIVT 249	Technical Drawing 2	1
CIVT 251	Elements of Structural Design - Concrete 1	3
CIVT 313	Transportation Engineering	3
CIVT 315	Building Law	2
CIVT 318	Transportation Engineering Lab	1
<b>Total</b>		<b>14</b>

TECH 350      TRAINING II      4

**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CIVT 253	Elements of Structural Design - Concrete 2	3
CIVT 317	Construction Project Management Lab	1
CIVT 319	Construction Jobsite Management	3
CIVT 327	Introduction to Environmental Engineering	3
CIVT 329	Building Information Modeling (BIM)	3
CSPR 202	Cultural & Social Sciences 2	3
TECH 390	Graduation Project Design	2
<b>Total</b>		<b>18</b>

**SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CIVT 241	HVAC Principles and Equipment	3
CIVT 245	Geotechnical Engineering Lab	1
CIVT 311	Foundation Design	3
CIVT 326	Structural Analysis Lab	1
CIVT 360	Green Building Rating Systems	3
CSPR 203	Cultural & Social Sciences 3	3
TECH 391	Graduation Project Implementation	2
<b>Total</b>		<b>16</b>

**Total credits**      **104**

# **BTECH – CIVIL & CONSTRUCTION TECHNOLOGY** **(WATER NETWORK AND TREATMENT TRACK)**

## **SEMESTER 1**

<u><b>Course Code</b></u>	<u><b>Course Title</b></u>	<u><b>Credit</b></u>
CIVT 211	Statics	3
CIVT 225	Applied Geology	3
CSIS 218	Computer Skills for Applied Technology	1
ENGL 203	English Communication Skills III	3
MATH 200A	Calculus I for Technology	3
MATH 211	Linear Algebra	3
<b>Total</b>		<b>16</b>

## **SEMESTER 2**

<u><b>Course Code</b></u>	<u><b>Course Title</b></u>	<u><b>Credit</b></u>
CIVT 223	Mechanics of Materials	3
CIVT 224	Technical Drawing 1	1
CIVT 234	Workshop Technologies	1
CIVT 312	Construction Materials & Methods	3
CSPR2xx	Cultural & Social Sciences 1	3
ENGL 2xx	English Elective	3
MATH 202	Calculus II	3
<b>Total</b>		<b>17</b>
TECH 250	Training I	2

## **SEMESTER 3**

<u><b>Course Code</b></u>	<u><b>Course Title</b></u>	<u><b>Credit</b></u>
CIVT 233	Theory of structures 1	3
CIVT 235	Plumbing and Electrical Installation	3
CIVT 242	Topography and Surveying	2
CIVT 243	Soil Mechanics & Foundation	3
CIVT 247	Topography and surveying Lab	1
CIVT 248	Soil Mechanics Lab	1
MECT 325	Fluid Mechanics	3
LISP 200	Library Use and Research Methods	1
<b>Total</b>		<b>17</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CIVT 240	Introduction to Geographic Information systems	1
CIVT 246	Strength of Materials Lab	1
CIVT 251	Elements of Structural Design - Concrete 1	3
WNTT 201	Water Chemistry	3
WNTT 221	Introduction to Hydrology	3
WNTT 231	Water Transportation Workshop	1
WNTT 232	Residential Water Networks and Treatment	3
CSPR2xx	Cultural & Social Sciences 2	3
<b>Total</b>		<b>18</b>
TECH 350	Training II	4

**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CIVT 253	Elements of Structural Design - Concrete 2	3
CIVT 319A	Construction Jobsite Management for Water Sector	3
WNTT 315	Fundamentals of Electricity and Electrotechnics	3
TECH 390	Graduation Project Design	2
WNTT 233	Water System Maintenance	3
WNTT 234	Environmental Legislation	2
WNTT 235	Mechanical Technologies	2
<b>Total</b>		<b>18</b>

**SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CIVT 311	Foundation Design	3
CIVT 326	Structural Analysis Lab	1
WNTT 321	Water Treatment Lab	1
WNTT 322	Irrigation Systems	1
WNTT 323	Waste Water Networks and Treatment	3
WNTT 324	Automation and Remote Management Lab	1
TECH 391	Graduation Project Implementation	2
<b>Total</b>		<b>12</b>
<b>Total credits</b>		<b>104</b>

## COURSE DESCRIPTIONS

### **CIVT 211 STATICS**

**3.0: 3 cr. E/F**

Composition and resolution of forces, free-body diagrams, analysis of forces acting on structures and machines, shear and bending moment diagrams, friction, centroid and moment of inertia.

### **CIVT 221 GENERAL APPLIED CHEMISTRY**

**3.0: 3 cr. E/ F**

This courses is designed to give the students a basic knowledge of chemistry change making them realize the importance of elements, components and mixture in everyday life. Also to show them how and chemical reactions occur and the significations of such chemical changes in the field of Biology, Medicine, Industry, ...

### **CIVT223 MECHANICS OF MATERIALS**

**3.0: 3 cr. E/F**

Introduction-Concept of stress; stress and strain. Axial loading; torsion; Pure bending; Transverse loading-Shear stress; Transformation of stress and strain; Deflection of beams; Columns. Prerequisite: CIVT211. Co-requisite: MATH200A.

### **CIVT 224 TECHNICAL DRAWING I**

**0.3: 1 cr. E/ F**

Constructional Geometry-constructing tangents. Plane curves and polygons. Orthographic drawing and theory of sketching shapes and surface identification. Orthographic projection of views. Sectional views and conventions. Pictorial drawing. Applications of AutoCad for 2D drawings and solid modeling; Project prepared using AutoCad.

### **CIVT 225 GEOLOGY**

**3.0: 3 cr. E/ F**

The course provides an introduction to the main geological processes and a broad appreciation of geohazards and geotechnical risks, of the formation and variability of geotechnical materials, and the importance of groundwater. Fundamental soil and rock properties are introduced in the context of basic soil mechanics.

### **CIVT 233 THEORY OF STRUCTURES I**

**3.0: 3 cr.E/ F**

Analysis of statically determinate structures: Elastic deformations; deflection of beams by Moment-Area Theorems, Conjugate-Beam Method. Deflections By Energy Methods, Virtual-Work Method, Castigliano's Second Theorem. Influence Lines and Criteria for Moving Loads; Statically Indeterminate Structures: Method of Consistent deformations; Slope-Deflection Method; Moment-Distribution Method. Pre-requisite: CIVT223

### **CIVT 234 WORKSHOP TECHNOLOGIES**

**0.3: 1 cr.E/ F**

Driling, milling, grinding, lath work, welding, molding, heat treatments, forging, electric workshop technologies.

### **CIVT 235 PLUMBING AND ELECTRICAL INSTALLATION**

**3.0: 3 cr.E/ F**

An introduction to the major engineering services found in buildings. Plumbing and electrical installation represent a significant and growing consideration, and this course provides an overview of key mechanical and hydraulic services including ventilation, air-conditioning, electrical, lifts, fire-fighting plumbing, sewerage, and the different regulatory authorities and requirements. It considers the impacts created by associated pipes, ducts and cabling requirements on design, construction and maintenance procedures. The course also discusses a range of integrated sustainability services to improve building performance. Prerequisite: CIVT224

### **CIVT 240 INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS**

**0.3: 1 cr. E/F**

Students will gain a practical knowledge of GIS software and the fundamentals of how GIS marries databases to a spatial framework. The class work will include lectures on topologies, measurement methods, coordinate systems, map projections with practical instruction in the computer lab. Students will draw upon current projects and issues to create maps and provide analysis. Prerequisite: CIVT242 and CIVT224.

**CIVT 241 HVAC PRINCIPLES AND EQUIPMENT****3.0: 3 cr.E/ F**

Environmental comfort parameters. Heat transfer in building sections. Estimating heating, cooling and ventilation loads and the choice of appropriate systems. Selection of equipment, design and layout of distribution ducts, pipes, and outlets. Prerequisite: MECT315 or CIVT235.

**CIVT 242 TOPOGRAHY AND SURVEYING****2.0: 2 cr.E/ F**

Principles of surveying, instruments, basic measuring procedures, error analysis, traverse, leveling and mapping, Principles and practice in measuring distances, elevation differences and angles; construction surveys, traverses, topographic surveys and subdivision of land, mass diagram, cut and fill calculations. Boundary surveys, area computations and profile surveys. Pre-requisite: MATH200A.

**CIVT 243 SOIL MECHANICS & FOUNDATIONS****3.0: 3 cr. E/F**

Soil explorations and testing, foundation for buildings, piles and footing, bracing of open trenches, sheet piling, and laboratory testing of soils. Stability of slopes, earth pressure, steady seepage. Pre-requisite: CIVT223.

**CIVT 244 REINFORCED CONCRETE I****3.0: 3 cr. F**

Strength and deformation of reinforced concrete according to the provisions of the ACI Building Code; Beams in flexure and shear; Bond and development of bars; Deflection; One way ribbed and solid slabs; Short columns. Prerequisite: CIVT 233.

**CIVT 245 GEOTECHNICAL ENGINEERING LAB****0.3: 1 cr. E/F**

Geotechnical analysis and design using commercial software PLAXIS including design of foundations and lateral earth retaining systems. Results, visualizations and assessment. Co-requisite: CIVT233.

**CIVT 246 STRENGTH OF MATERIALS LABORATORY****0.3: 1 cr. E/F**

Concrete constituents and mix design; time of setting of cement; mixing and testing fresh concrete; determination of density of hardened concrete; compressive strength of concrete cubes and cylinders; flexural tensile strength of concrete; splitting tensile Strength of cylindrical concrete specimens; determination of static modulus of elasticity in compression; tensile strength of steel bars; Marshall stability and flow of bituminous mixtures.

Prerequisite: CIVT312.

**CIVT 247 TOPOGRAPHY AND SURVEYING LAB****0.3: 1 cr. E/F**

Field application of concepts learned in class including basic measuring procedures for distances, elevations, angles, bearings, azimuth; theory of measurements and errors, mapping, construction and topographic surveys, traverses, adjustment and closure, area and volume computations. Co-requisite: CIVT242.

**CIVT 248 SOIL MECHANICS LAB****0.3: 1 cr. E/ F**

Soil properties and behavior, soil classifications, sieve analysis of soil, specific gravity of soil, relative density of soil, Atterberg limits, Proctor test, CBR test, in situ density of base material, hydrometer of fine grained soil, permeameter test (Constant head and falling head method), consolidation and settlement, strength characteristics. Co-requisite: CIVT243

**CIVT249 TECHNICAL DRAWING****0.3: 1 cr. E/ F**

Graphical analysis of engineering drawings, computer-aided drafting and work drawing, applications: RC slabs, beams, stairs, retaining walls, footing, RC bridges, weirs, earth slopes, roads, interchanges and sections. AutoCAD Applications. Prerequisite CIVT224.

**CIVT 250 TRAINING 1****4 cr.**

The students should do a training in an institution whereby they get exposed and engaged in activities related to their field of studies. At the end of the training the students should deliver a report and a presentation that describe their work during the training period.

**CIVT251 ELEMENTS OF STRUCTURAL DESIGN - CONCRETE I****3.0: 3 CR. E/F**

Strength and deformation of reinforced concrete according to the provisions of the ACI Building Code; Beams in flexure and shear; Bond and development of bars; Deflection; One way ribbed and solid slabs; Short columns. Prerequisite: CIVT233.

**CIVT253 ELEMENTS OF STRUCTURAL DESIGN - CONCRETE II****3.0: 3 CR. E/F**

Design of reinforced concrete building and floor slab systems. Moment curvature relationship for beams and columns, bi-axially loaded columns, slenderness effects, interaction diagrams, shear and torsion in members. Pre-requisite: CIVT251.

**CIVT 311 FOUNDATION DESIGN****3.0: 3 cr. E/F**

Geotechnical engineering applications to the analysis, design construction of shallow foundations and earth retaining structures. Pre-requisites: CIVT243, CIVT251.

**CIVT 312 CONSTRUCTION MATERIALS AND METHODS****3.0: 3 cr.E/ F**

Materials and methods used in the construction industry . Physical and mechanical properties of construction materials; Portland cement concrete, asphalt, wood, ferrous metals, non-ferrous metals; proportioning of concrete mixtures including admixtures.

**CIVT 313 TRANSPORTATION ENGINEERING****3.0: 3 cr.E/ F**

The role of transportation in society and the engineer's role in planning, design and operation of transportation system; consideration of system constraints, costs and basic design criteria. Theory and practice in highway design according to AASHTO criteria; design of vertical and horizontal cross-section. Introduction to traffic elements including intersection design and analysis of roads and intersections service levels. Co-requisite or Prerequisite: CIVT242.

**CIVT 314 CONSTRUCTION MANAGEMENT****3.0: 2 cr. E/ F**

Basic elements of management of civil engineering projects; roles of all participants in the process: owners, designers, contractors and suppliers; emphasis on contractual aspect of the process, project estimate, planning and controls. Planning, scheduling and control of construction projects; management functions, network techniques(CPM), resource scheduling, construction financing and cost/ schedule relations. Pre-requisites: CIVT 224, 244.

**CIVT 315 BUILDING LAW****3.0: 3 cr. A**

Plans, Specification and writing and interpretation, and contract documents related to the construction industry. Prerequisite: CIVT224.

**CIVT 316 ENGINEERING ECONOMY****3.0: 2 cr. E/ F**

The course introduces the student to the fundamental concepts of engineering economy covering: economic analysis of projects, operations analysis, as well as the evaluation of alternatives, namely, benefit/ cost ratio, present and annual worth, internal rate of return, and utility study. The course replacement analysis, depreciation methods, and risk analysis. Prerequisite: MECT 211.

**CIVT 317 CONSTRUCTION MANAGEMENT LAB****0.3: 1 cr. E/ F**

Use of commercial software for the operations, planning, budgeting, scheduling, resource allocation, resource leveling, and controlling construction projects. Co-requisite: CIVT319.

**CIVT 318 TRANSPORTATION ENGINEERING LAB****0.3: 1 cr. E/F**

Highway design using professional commercial softwares integrating planning, geometric design including horizontal and vertical curves design, cross-sections with cut and fill calculations, and traffic modeling including traffic lights design and level of service. Co-requisite: CIVT313.

**CIVT 319 CONSTRUCTION JOBSITE MANAGEMENT****3.0: 3 cr. E/F**

This course provides the students with a working knowledge of the construction process, responsibilities of different parties, importance of project documentation, and effective work coordination. Details of jobsite layout planning, personnel management and labor relations, dispute resolution and negotiations, long term and short term procurements are discussed. The fundamentals of work progress measurement, time and cost control, and change order management are covered in detail. Corequisite: CIVT251

**CIVT 321 REINFORCED CONCRETE II****3.0: 3 cr. E/F**

Design of reinforced concrete building and floor slab systems. Moment curvature relationship for beams and columns, bi-axially loaded columns, slenderness effects, interaction diagrams, shear and torsion in members. Extensive use of microcomputers.  
Pre-requisite: CIVT 244.

**CIVT 322 SANITARY ENGINEERING****3.0: 3 cr. E/F**

Sources and quantities of water supply and methods of collection, treatment and distribution. Quantities, treatment and disposal of wastewater. Quality parameters, criteria and international standards for drinking water and wastewater pollution control.  
Pre-requisite: MECT 325.

**CIVT326 STRUCTURAL ANALYSIS LAB****0.3: 1 cr. E/F**

This course uses computer-based methods for the analysis of large-scale structural systems. Topics covered include: modeling strategies for complex structures: application to tall buildings, cable-stayed bridges, and tension structures. Co-requisite: CIVT253.

**CIVT327 INTRODUCTION TO ENVIRONMENTAL ENGINEERING****3.0: 3 cr. E/ F**

This course is an introduction to the major environmental topics addressed by environmental engineers, namely water management (potable, storm and wastewater), solid waste management, renewable energies, sustainable buildings and the LEED accreditation system. Special attention will be paid to the principle of sustainable development as well as to the main tools for assessing the impact on the environment. Consequently, students will be familiar with the various environmental issues and the solutions to be considered. The acquired knowledge will be materialized by a mini-project carried out by the students and which will relate to a specific site study.

**CIVT329 BUILDING INFORMATION MODELING (BIM) IN CONSTRUCTION MANAGEMENT****3.0: 3 cr. E/F**

The Building Information Modeling BIM concept envisages virtual construction of a facility prior to its actual physical construction, in order to reduce uncertainty, improve safety, work out problems, and simulate and analyze potential impacts. BIM prevents errors by enabling conflict or 'clash detection' whereby the computer model visually highlights to the team where parts of the building may wrongly intersect. This course introduces BIM as a new process model to run and manage construction projects. It addresses the use of BIM in design, construction, management, operation, maintenance, and use of buildings. It tackles the following topics: collaborative design, clash detection, level of development, BIM contracts, automated code checking, Lean construction, and integrated project delivery. Pre/Co-requisite: CIVT319

**CIVT 350 TRAINING 2****4 cr.**

The students should do a training in an institution whereby they get exposed and engaged in activities related to their field of studies.

**CIVT 360 GREEN BUILDING RATING SYSTEMS****3.0: 3 cr. E/F**

A thorough overview of advanced planning and management techniques for the construction process. Topics include project communications, Critical Path Method CPM scheduling, safety, construction processes, risk allocation, accounting principles, material testing and quality control techniques, change orders, claims and disputes. Students also study the LEED rating system. Industry standard computer scheduling software, industry standard project management software and the use of value engineering (VE) workshop to reduce construction costs are also covered.

Prerequisite: CIVT327.

**WNTT 201 WATER CHEMISTRY****3.0: 3 cr.E/ F**

Water chemistry is an essential part of the water track program. The objective of the course is to synergize key aspects of fundamental chemistry and engineering technology problem solving intuition to enable the students to pursue solutions to water chemistry problems. Students cultivate their understanding of chemistry through inquiry-based investigations, as they explore content such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, equilibrium and water parameters.

**WNTT 221 INTRODUCTION TO HYDROLOGY****3.0: 3 cr.E/ F**

This course includes the study of hydrologic cycle, its dynamics and components, with an emphasis on the terrestrial phase. Field and lab work will involve measurement techniques and the analysis of hydrologic data. Emphasis will also be placed on Lebanese water resources and their management. Prerequisite: CIVT225.

**WNTT 231 WATER TRANSPORTATION WORKSHOP****0.3: 1 cr.E/ F**

The course covers different topics related to water supply, water transport and distribution, pumping stations, and water leakage. The workshop provides students with hands on experience and knowledge about different components of water transport and distribution systems, in addition to topics related to hydraulics of pressurized flows: single pipe calculation, branched and looped networks, choice of pipe materials, valves, and pump characteristics, pressure related demand, hydraulics of storage and pumps. Prerequisite: CIVT235.

**WNTT 232 RESIDENTIAL WATER TREATMENT AND NETWORKS****3.0: 3 cr.E/ F**

The course begins with the definition of the physical, chemical and microbial aspects of the quality of drinking water. It then covers sizing methods based on water demand, selection of drinking water source, drinking water distribution and treatment systems as well as network design tools. The course will also provide an overview of smart water supply systems, including automation and leak detection. Prerequisite: CIVT235

**WNTT 233 WATER SYSTEM MAINTENANCE****3.0: 3 cr.E/ F**

This course introduces students to the practical aspects of operating and maintaining drinking water supply systems and treatment plants, with an emphasis on safe practices. Topics covered include operation, maintenance and rehabilitation of plants and wells. Prerequisite: WNTT231 and WNTT232

**WNTT 234 ENVIRONMENTAL LEGISLATION****2.0: 2 cr.E/ F**

This course aims to inform the students about different legal aspects regulating the water sector in Lebanon. It is designed to provide them with a practical overview and working knowledge of environmental laws and regulations governing infrastructure and pollution while covering topics such as water standards, quality control and permits.

**WNTT235 Mechanical Technologies****2.0: 2 cr.E/ F**

This course provides and applies the various mechanical tools of maintenance to the water sector. It also allows to understand the different maintenance policies and strategies, taking into account the technical and economical stakes imposed by the operators and by the regulation in force on the discharges in the natural environment. This module includes: Mechanical maintenance: dismantling, changing bearings, lubrication, changing mechanical seals, criticality study in a station, maintenance optimization.

**WNTT315 Electricity and Electrotechnics****3.0 : 3 cr.E/ F**

This course represent the fundamentals that one must have for the practice of a technical activity using electricity (electronic assemblies, cabling, etc...) required for water sector applications. It includes the structure of HV and LV distribution networks, grounding networks and practical approach to the calculation of a distribution cable section. A special part of this course is dedicated for technology and maintenance of asynchronous and synchronous permanent magnet electric motors.

Pre-requisite: CIVT235.

**WNTT 321 WATER TREATMENT LAB****0.3: 1 cr.E/ F**

During this course, students will apply basic chemical principles to better understand water quality, drinking water treatment and wastewater treatment. They will also learn how to measure common water and wastewater constituents.

**WNTT 322 IRRIGATION SYSTEMS****3.0: 3 cr.E/ F**

This course offers students survey of irrigation systems, system configurations, factors that influence irrigation efficiency, crop water requirements, energy requirements, pumps, and irrigation scheduling. It provides them with sufficient technical background to allow them to select systems, develop operational specifications and monitor performance, and provide the technical skills that are needed to manage irrigation operations. This course is offered in common with agricultural Engineering Technology department. Prerequisite: WNTT221.

**WNTT 323 Waste Water Treatment****3.0: 3 cr.E/ F**

This course focuses on the processes required for wastewater treatment. Quality criteria for different water uses and reuses will be presented. The chemical, physical and biological processes involved in wastewater treatment will be described with a focus on the operational units and processes, such as screening, flocculation-coagulation, filtration, disinfection amongst others. The course will include field visits allowing students to confront their knowledge with implemented projects in Lebanon. Corequisite: WNTT321.

**COMP 211 COMPUTER TECHNIQUES I****0.3: 1 cr. E/F**

Principles of personal computing as used in every day problem solving. The course includes personal productivity tool such as word processors, spreadsheets, presentation software, statistical software, data analysis software, database querying and internet use.

**COMP 221 COMPUTER TECHNIQUES II****0.3: 1 cr. E/F**

Principles of business computing as used in modern enterprises. What-if type analysis, business charting and graphing, creating database reports, internet browsing, basic web page creation and maintenance

**INFT 211 END USER COMPUTING****3.0: 3 cr. E/F**

This course helps the student become a power user of several software packages used in business problemsolving. Topics covered include: personal productivity tools, what-if analysis, business charting and graphing, Internet browsing, and web page creation and maintenance. The course employs a combination of lecturebased delivery of material and experimental hands-on problem solving workshops.

**INFT 212 INTRODUCTION TO BUSINESS****3.0: 3 cr. E/F**

This is an introduction to the major fields in business administration. It includes principles of management, marketing, finance, accounting and information systems.

**INFT 213 DISCRETE MATHEMATICS****3.0: 3 cr. E/F**

This course teaches students how to think mathematically by covering the topics of computer representation for numbers, symbolic logic, sets, functions, induction recursion, Boolean algebra, and graph theory. The course also presents the fundamentals and techniques of linear algebra, providing the students with the tools to analyze matrices and determinants for solving systems of linear equations and giving them a solid knowledge on linear transformations

**INFT 214 MATHEMATICS 2****3.0: 3 cr. E/F**

This course introduces the basic fundamentals of Calculus. Topics include: Continuous functions using intervals, odd and even parity, Periodicity, Fast and slow rhythms, correction, change of scale, Non derivative functions at a single point, Differentials, Derivatives of complex functions, Exponential and logarithmic functions, Properties of reciprocal trigonometric functions, Definition of the Riemann integral, Properties of the integral.

**INFT 215 PROGRAMMING I****3.0: 3 cr. E/F**

Basics of algorithmic and programming language.

**INFT 221 OPERATING SYSTEMS****3.0: 3 cr. E/F**

This course is a comprehensive survey of operating systems principles. Topics covered include: process description and control, threads, process and disk scheduling, file and memory and I/O management, concurrency, networking and distributed processing, security.

**INFT 222 OPEN SOURCE SOFTWARE****3.0: 3 cr. E/F**

The course introduces the students to OSS philosophy, culture, benefits, drawbacks, applications, environment and development. It is a mixture of lecture, Lab and research instruction.

**INFT 223 PROGRAMMING II****3.0: 3 cr. E/F**

Approach to object-oriented design, data structure. Object-oriented language, C++ / C# or Java for example. Pre-requisite: INFT 215.

**INFT 224 HUMAN COMPUTER INTERACTION****3.0: 2 cr. E/F**

Presents a comprehensive introduction to the principles and techniques of human computer interaction: Foundations of HCI; context; human centered development; principles of good design; engineering tradeoffs; introduction to usability testing; Graphical user-interface design. Pre-requisite: INFT 215.

**INFT 225 PROGRAMMING METHODOLOGY****3.0: 2 cr. E/F**

This course introduces students the foundation of the software development process. Programming is introduced as a problem solving activity by introducing students to a full-featured programming language (Java). Students learn all the skills in program design, implementation, and debugging necessary to solve computational problems. Emphasis is put on effective use of abstraction and the acquisition of software development skills. Topics include: Flow control, object-oriented analysis and design, abstraction, methods, arrays, encapsulation, inheritance.

Prerequisite: INFT 215.

**INFT 231 NETWORKING PRINCIPLES AND DESIGN****3.0: 3 cr. E/F**

This course is an introduction to network principles and network design. Topics include: Basic concepts and terminology of computer networks, networking models and theory, networking protocols, LAN, WAN, MAN, wireless and mobile network technologies, network performance, network security, layers of the Internet Protocol Suite (the TCP/IP family of protocols), Internet addressing (IPv4, IPv6), and network applications and services (such as DNS, HTTP, peer-to-peer networks, web servers, VPN, open SSL.)

**INFT 232 WEB PROGRAMMING****3.0: 3 cr. E/F**

This course is devoted to a survey Web site preparation, considering both client- and server-side programming. Special emphasis will be assigned to mark-up and scripting languages. Participant of the course will learn style considerations and Web site scripting and technology, web forms, control and web services will as well be covered.

**INFT 233 DATABASE****3.0: 3 cr. E/F**

Data, DBMS architecture, schema and sub-schema, levels of data representation, database system life cycles. Relations within database architecture. Decomposition, normalization, hierarchy, and network. Data description language (DDL). Data manipulation language (DML); query languages and query optimization in centralization systems. Database security, integrity, and concurrence.

**INFT 234 COMPUTER GRAPHICS****3.0: 3 cr. E/F**

The student learns how to produce different kinds of illustrations and posters using computer software: advertising art, technical drawing, book illustration, and map production. Topics covered include: drawing, transformations, layers, color palette, 3D drawing, perspective, light, rendering, and texture.

**INFT 235 OBJECT-ORIENTED PROGRAMMING****3.0: 3 cr. E/F**

This is an advanced programming course. It covers the programming paradigms with examples, and the transition between modular programming and object-oriented programming. The course also covers data categorization and subdivision into classes and discusses inheritance of operations from one class to another. Pre-requisite: INFT 225.

**INFT 241 SYSTEMS ANALYSIS & DESIGN****3.0: 3 cr. E/F**

Analysis concepts (fact-finding, interview, feasibility study, user requirements, structured system analysis, documentation). Design concepts (design of I/O, file specification, database, algorithms, software and hardware specifications). Project management. Practical applications. Schedule and cost.

**INFT 242 SOFTWARE PROCESSING****3.0: 2 cr. E/F**

Topics include: the principal issues associated with software evolution and their impact on the software life cycle, the challenges of maintaining legacy systems and the need for reverse engineering, the process of regression testing and its role in release management, the impact of a change request to an existing product of medium size, software reuse.

**INFT 243 SWITCHING IN LANS****3.0: 2 cr. E/F**

The course focuses on advanced IP addressing techniques (Variable Length Subnet Masking [VLSM]), command-line interface configuration of switches, Ethernet switching, Virtual LANs (VLANs), Spanning Tree Protocol (STP), and VLAN Trunking Protocol (VTP).

Pre-requisite: INFT 231.

**INFT 244 JAVA TECHNOLOGY****3.0: 2 cr. E/F**

This course introduces Java as a technology and a development and deployment platform (J2SE). It provides students with the skills to create applications that leverage the object-oriented features of Java, such as encapsulation, inheritance, and polymorphism. The course introduces students to GUI programming, multithreading, networking, and event-driven programming using Java technology GUI components. Students will develop classes to connect to SQL database systems by using the core aspects of JDBC API. Other topics include: Exception handling, multi-threading, RMI, two-tier and three-tier Java technology applications.

Pre-requisite: INFT 235.

**INFT 245 MULTIMEDIA PROGRAMMING****3.0: 2 cr. E/F**

This course permits students to acquire a good knowledge of multimedia technologies. The student learns through practical projects to edit and produce video clip with sound and animation. Topics include video morphing (dynamic imaging).

**INFT 246 DATABASE SYSTEMS MANAGEMENT****3.0: 3 cr. E/F**

The course is an advanced one in database technologies and a continuation of the course dealing with database design. Topics included are: Storage and file structure, indexing and hashing, query processing, transaction concept, concurrency control, and recovery systems.

Pre-requisite: INFT 233.

**INFT 250 TRAINING I****4 cr.**

The students should do a training in an institution whereby they get exposed and engaged in activities related to their field of studies. At the end of the training the students should deliver a report and a presentation that describe their work during the training period.

**INFT 311 SOFTWARE QUALITY****3.0: 3 cr. E/F**

Topics include: program validation and verification, software validation tools, the different types and levels of testing (unit, integration, systems, and acceptance), test plan, inspection of code segment.

**INFT 312 DIGITAL LOGIC****3.0: 3 cr. E/F**

Fundamental building blocks (logic gates, flip-flops, counters, registers, PLA); logic expressions, minimization, sum of product forms; register transfer notation; physical considerations (gate delays, fan-in, fan-out); Data representation; Assembly level organization and memory systems.

**INFT 313 PLATFORM TECHNOLOGIES****3.0: 3 cr. E/F**

Topics include: Configure and use application server with server roles, application servers, managing web applications, troubleshooting servers with failed request tracing, using and managing remote programs and gateways, including troubleshooting and performance optimization.

**INFT 314 SECURITY ISSUES AND PRINCIPLES****3.0: 3 cr. E/F**

Threats to information resources and appropriate countermeasures. Cryptography, identification and authentication, access control models and mechanisms, multilevel database security, steganography, Internet security, and intrusion detection and prevention.

**IINFT 315 TECHNICAL SUPPORT****3.0: 3 cr. E/F**

Topics included: A wide variety of strategies to build skill in problem solving. Practice of creative/lateral thinking techniques and communication skills to approach technical and non-technical problems. In-depth PC hardware and software installation and configuration. Portfolio materials preparation demonstrating problem solving skills and experience.

**INFT 321 NETWORK CONFIGURATION****3.0: 3 cr. E/F**

This course provides a foundation of network administration including account administration, resource allocation and optimization, and service management. Strategies for maintaining robust and secure networks are explored. Topics include, but not limited to: Network administration and configuration, network management (SNMP), network security, access controls, error correction, routing protocols, congestion control (TCP, UDP), selection of topics including DHCP, ICMP, VPNs, and multicast

**INFT 322 DIGITAL MEDIA DEVELOPMENT****3.0: 3 cr. E/F**

Students learn how to design the content and structure of complex multimedia systems using a wide variety of industry standard tools. They develop skills in creating a range of resources - image, sound, animation, video, 3D and interactive elements - and learn how to assemble them into engaging, usable and useful products and services. By the end of the course students are competent in using the latest technologies to develop innovative digital media products.

**INFT 323 SYSTEMS ADMINISTRATION****3.0: 3 cr. E/F**

This course provides a strong practical experience to operating systems, topics included: Samba, Email, Web serving, remote access, networking setup, proxy services, firewall and security administration, user and group accounts management, disaster recovery.

**INFT 324 GRADUATION PROJECT****3.0: 3 cr. E/F**

To graduate, students have to finish a project under the direct supervision of a faculty member. The project should cover a practical aspect of a research for students to work on its design from conception through implementation and testing. Students meet regularly with the instructor to track technical and project management issues. Complete project documentation, written reports and oral presentations are required.

**INFT 350 TRAINING 2****4 cr.**

The students should do a training in an institution whereby they get exposed and engaged in activities related to their field of studies.

**LISP 200 LIBRARY USE AND RESEARCH METHODS****1.5. 0: 1 cr. E/F**

This course teaches the fundamentals of library use and research techniques, in addition, it focuses on the uses of the different library resources and their use. This course is free of charge.

Prerequisite: FREN 203.

Corequisite: ENGT 202.

# **DEPARTMENT OF MECHATRONICS TECHNOLOGY**

Mechatronics is an emerging field of technology that integrates fundamentals and application electrical, mechanical, computer sciences, control and information technology fields. It particularly revolves around the interaction between these technologies. The Department of Mechatronics at the Issam Fares Faculty of Technology combines areas of technology to allow the design, development, and application of smart devices in an integrated cross-disciplinary manner.

## **Objectives:**

The Mechatronics Technology program prepares students for a broad range of professional careers in mechatronics, automation, robotics, and manufacturing.

The educational objectives of the department of Mechatronics Technology are to enable graduates to:

- Meet dynamic technological challenges as leaders and members of engineering and technical teams.
- Develop methods required for the control of applications and supervision of industrial processes and embedded systems (sensors, processors, actuators and networks).
- Acquire skills for the specification, realization, installation, use and maintenance of interconnected electromechanical systems.
- Be prepared for successful careers in the areas associated with the analysis, development, implementation, and applied design.

## **Outcomes:**

With a Bachelor of Technology in Mechatronics, students will acquire the following competencies:

- Ability to model and build mechatronic systems and implement these systems.
- Ability to apply technological knowledge and theories for the development of new products.
- Ability to design technology systems using interdisciplinary approach.
- Ability to use the techniques, skills, and modern mechatronics tools necessary for technology practice.
- Ability to function effectively as members of multidisciplinary teams.
- Ability to exhibit skills for lifelong learning.
- Ability to Exhibit knowledge and skills consistent with the expectations of a practicing technologist.

# **BTECH – MECHATRONICS TECHNOLOGY**

## **SEMESTER 1**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ENGL203	English Communication Skills Iii	3
CSIS206	Principles of Programming	3
CSIS218	Computer Skills for Applied Technology	1
MATH200A	Calculus I for Technology	3
PHYS205	General Physics	3
MECT214	Electrical Circuits	3
MECT216	Electrical Circuits & PCB Lab	1
<b>Total</b>		<b>17</b>

## **SEMESTER 2**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
ENGL2xx	English Elective	3
MATH202	Calculus II	3
MECT220	Electronics	3
MECT226	Electronics & PCB Lab	1
MECT228	Advanced Programming	3
TELT214	Logic Design	3
TELT216	Logic Design Lab	1
<b>Total</b>		<b>17</b>

TECH 250	Training I	2
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## **SEMESTER 3**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
MATH246	Probability	3
MECT233	Power Electronics	3
MECT238	Sensors & Instrumentation	3
MECT217	Maintenance and Repair I	1
MECT246	Dynamics	3
TELT251	Microcontrollers	3
<b>Total</b>		<b>16</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSPRXXX	Cultural & Social Sciences I	3
LISP200	Library Use & Research Methods	1
MATH211	Linear Algebra	3
MECT248	Industrial Automation	3
MECT252	Control Systems	3
TELT225	CISCO: Introduction to Networks	3
TELT261	Embedded Systems Lab	1

**Total** **17**

TECH 350      Training II **4**

**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSPRXXX	Cultural & Social Sciences II	3
MECT245	Cad Design	1
MECT313	Machinery	3
MECT319	Industrial Robots	3
MECT320	Industrial Automation Lab	1
MECT330	Labor Law	1
Elective I	MECT 315 or MECT 332	3
Elective-Lab I	MECT 300 or MECT 337	1
TECH390	Graduation Project Design	2

**Total** **18**

**SEMESTER 6\***

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSPRXXX	Cultural & Social Sciences III	3
Elective II	MECT 325 or MECT 333 or MECT 335	3
Elective III	MECT 324 or MECT 334 or CIVT 241	3
Elective-Lab II	MECT 336 or MECT 353	1
TECH391	Graduation Project Implementation	2

**Total** **12**

**Total credits** **103**

## ELECTIVES

### SEMESTER 5

#### **Elective I**

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
MECT315	Applied Thermodynamics	3
MECT332	Applied Artificial Intelligence	3

#### **Elective-Lab I**

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
MECT300	Maintenance and Repair II	1
MECT337	Applied Artificial Intelligence Lab	1

### SEMESTER 6:

#### **Elective II**

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
MECT325	Fluid Mechanics	3
MECT333	Electrical Installations	3
MECT335	Applied Machine Learning	3

#### **Elective III**

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
MECT324	Renewable Energy	3
MECT334	IoT Programming	3
CIVT241	HVAC Principles & Equipment	3

#### **Elective-Lab II**

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
MECT336	Applied Machine Learning Lab	1
MECT353	Home Automation Protocols	1

# COURSE DESCRIPTIONS

## **MECT 211 CALCULUS I**

**3.0: 3 cr. E/F**

This course covers techniques of integration for definite and their applications. The course then gives an overview of first and second order linear differential equations and their solution sets. The course finally presents Laplace transform, Fourier Series and their applications.

## **MECT 212 GENERAL PHYSICS**

**3.0: 2 cr. E/F**

This course is designed to provide an overview of algebra based introductory physics, which is a requirement for most undergraduate science major students. The scope of this course is to develop knowledge of the fundamentals of mechanics, that including vectors, velocity and acceleration, motion in one dimension, falling bodies, motion in two dimensions, work and energy, energy conservation, circular and rotational motion. It is recommended for students to be up to date in studying lectures and notes and doing corresponding assigned problems on time.

## **MECT 215 ELECTRICAL CIRCUITS**

**2.0: 2 cr. E/F**

Introduction to theory, analysis and design of electric circuits. Voltage, current, power, energy, resistance, capacitance, inductance. Kirchoff's laws node analysis, mesh analysis, Thevenin's theorem, Norton's theorem, steady state and transient analysis, AC, DC, operational amplifiers, transfer functions.

## **MECT 214: ELECTRICAL CIRCUITS**

**3.0: 3 cr. E/F**

This course is an introductory course to concepts of electric circuits. The aim is to understand the operation of these circuits and know the main laws related, to model these circuits of in continuous or alternating currents. Circuit analysis techniques and theorems are covered and applied theoretically.  
Co-requisite: MATH200A.

## **MECT 216 ELECTRICAL CIRCUITS & PCB LAB**

**0.3: 1 cr. E/F**

In this course, students will acquire hands-on experience with electrical circuits discussed in MECT 214. The labs will cover basic resistive circuits and analysis of DC and AC networks containing resistive, capacitive, and inductive circuit elements. Students use Multisim software to analyze their circuit besides they will be able to design and implement their own PCB projects, starting from schematic creation and interpretation to generating output documentation.

Co-requisite: MECT214.

## **MECT217 MAINTENANCE AND REPAIR I**

**0.3: 1 cr. E/F**

This lab course covers various processes as developing basic working knowledge of the principles of electrical, electronic and electromechanical equipment including design, installation, and operation in addition to the preventive maintenance inspections, record keeping and safety procedures.

## **MECT220 ELECTRONICS**

**3.0: 3 cr. E/F**

The aim of this course is to understand the operation of electronic solid-state devices such as diodes and different types of transistors, in both DC and AC circuits. The physical operating principles of these nonlinear devices are covered.

Prerequisite: MECT214.

## **MECT 221 LINEAR ALGEBRA**

**3.0: 3 cr. E/F**

Linear Systems. Matrix Operations. Echelon Form. Vector Spaces. Linear Transformation. Determinants. Eigenvalues and Eigenvectors.

**MECT 222 SENSORS****3.0: 2 cr. E/F**

Topics include: Principle, usage patterns and implementation of position sensors, speed, temperature, pressure ... Formatting signal simulation, Setting the output quantities (torque, speed) of conventional engines (continuous, asynchronous, stepper brushless). Simulation, Implementation test bench.  
Pre-requisite: MECT 213.  
Co-requisite: MECT 225.

**MECT 224 INDUSTRIAL AUTOMATION I****2.1: 2 cr. E/F**

This course covers the following topics: Architecture of a programmable controller, Programming language (LD (Ladder), SFC (Sequential Function Chart), FB (Function Block Diagram), ST (Structured Text)), Input module, digital and analog outputs, Driving an electromagnetic load.  
Pre-requisite: TELT 215.

**MECT 225 ELECTRONICS****2.0: 2 cr. E/F**

The aim of this course is to understand the operation of electronic solid state devices such as diodes, bipolar junction transistor and metal oxide semi-conductor field effects transistors (MOSFET). The physical operating principles of these nonlinear devices will be covered.  
Prerequisite: MECT 215.

**MECT226 ELECTRONICS & PCB LAB****0.3: 1 cr. E/F**

In this course, the student will acquire hands-on experience with electrical circuits discussed in MECT 220. The labs will cover analysis of sinusoidal AC networks containing electronic devices. Students will be able to design and implement their own PCB projects, starting from schematic creation and interpretation to generating output documentation.  
Prerequisite: MECT216, Co-requisite: MECT220.

**MECT 228 ADVANCED PROGRAMMING****3.0: 3 cr. E/F**

The purpose of this course is to provide technology engineers with the tools to develop human robotic interfaces and gaming features to simulate robotic manipulations. This course introduces (i) object oriented programming (classes and objects), (ii) GUI application design (GUI controls such as buttons, textboxes, pictureboxes, etc.), (iii) 2D gaming (architecture and physics) and (iv) resources management (filesIO for saving and loading).  
Prerequisite: CSIS206.

**MECT 231 PROBABILITIES****3.0: 2 cr. E/F**

The course covers the following topics: random variable, probability distribution(discrete, continuous, joint), cumulative distribution, mathematical expectation, Estimation and Test of Hypotheses.

**MECT 232 OPTOELECTRONICS****3.0: 2 cr. E/F**

This course covers the basics of optoelectronics. First, it gives a review about the wave motion (traveling and standing waves). Then, it presents the electromagnetic waves, the interference, the diffraction and the polarization phenomena. The laws of geometrical optics are reviewed and specially the total internal reflection. This part explain the propagation of light in optical fiber. Finally, the course presents the optical fibers physics, the optical sources, the photodetectors and the optical amplifiers.

**MECT 233 POWER ELECTRONICS****3.1: 3 cr. E/F**

This course starts with an introduction to power electronics, periodic reminders of non-sinusoidal signals and basic electronic components (diodes, transistors, thyristors...). Rectifiers (single/three-phase, controlled / uncontrolled) are then presented in detail with capacitive and inductive filtering. Different types of converters are also studied, mainly AC/ DC rectifiers and DC/ AC inverters.  
Prerequisite: MECT220.

**MECT 234 LINEAR SYSTEMS****3.0: 2 cr. E/F**

In this course, the control of the first and the second order continuous linear control systems are studied. The study involves the time domain analysis and the frequency domain analysis of both systems. Open loop and closed loop control analyses, closed loop system stability criteria (Cauchy, Nyquist, revers, Black criteria), precision of the control systems, and controllers (PD, PI, PID) are all investigated. Adding to this, the course covers technical topics like identification of processes using Strejc and Broida models, industrial techniques for regulation and control.

Pre-requisite: MECT 211.

**MECT 235 SCIENCE OF MATERIALS****3.0: 3 cr. E/F**

This course covers the following topics: Atomic structures of materials, materials classification, crystal imperfections, Electrical and mechanical properties of metal, composite materials and corrosion.

**MECT 236 STATICS****3.0: 2 cr. E/F**

Composition and resolution of forces, free-body diagrams, analysis of forces acting on structures and machines, shear and bending moment diagrams, friction, centroid and moment of inertia.

**MECT238 SENSORS & INSTRUMENTATION****3.0: 3cr. E/F**

This course introduces the principles, usage and implementation of various types of sensors such as position, speed, temperature, pressure sensors, etc. Methods of interfacing sensors to electronics devices are also presented. In this course, students will also learn how to analyze, design, build and troubleshoot a variety of sensors circuits.

Prerequisite: MECT214.

**MECT 241 CALCULUS II****3.0: 2 cr. E/F**

The course covers the following topics: multivariable functions, Lagrange Multipliers, Multiple integrals: double and triple (Cartesian, polar, spherical and cylindrical coordinates). Green and Stokes Theorem.

Prerequisite: MECT 211.

**MECT 242 CONTROL SYSTEMS****3.0: 2 cr. E/F**

In this course, the control of the first and the second order digital linear control systems are studied. The study involves open loop and closed loop discrete analyses, closed loop stability analysis like Nyquist criteria, stability margin and precision of discrete control systems. Also, the course investigates digital controller calculations, PID, syntheses of digital controllers, RST controller, and other practical aspects for digital controllers.

Pre-requisite: MECT 234.

**MECT 244 PROJECT MANAGEMENT****1.5. 0: 1 cr. E/F**

Topics include: Project Management: Perimeter project definition and scheduling, Time Management: PERT, GANTT, Milestones, Resource Management, and Cost Management. Practical work on Microsoft Project or PSN8is done. The second part of this course covers Functional Analysis: Scope of the system, manifolds Diagram Interactors. FAST: Function Analysis System Technique. SADT: Structured Analysis and Design Technique. GMMA: Management Methods for On and Off.

**MECT245 CAD DESIGN****0.3: 1 cr. E/F**

This computer-based course covers concepts and practices in lettering, geometric construction, multi-view and auxiliary projections, sections and connections, dimensioning, and isometric and oblique pictorials. Architectural drawings of residential/commercial/ industrial buildings meeting local specifications. Electrical and mechanical views, sectioning, hatching and assembling of mechanical machines and equipment.

**MECT246 DYNAMICS****3.0: 3 cr. E/F**

This course is divided into two parts: kinematics, which treats only the geometric aspects of the motion, and kinetics, which is the analysis of the forces causing the motion. The dynamics of a particle will be discussed followed by topics in rigid-body dynamics in both two and three dimensions.

Prerequisite: PHYS205

**MECT 247 MOBILE ROBOTS****2.1: 2 cr. E/F**

This course constructs a gateway to the robotic environment. The students will benefit from their programming knowledge to implement major programs for an autonomous robot based on a set of very important sensors: infrared, grayscale, ultrasonic and a camera module and others.

The implemented applications can be entitled as robot-environment interaction or robot-human interaction. The essential target is to obtain a fully automatic robot that can be used to interact or help in many different fields.

Prerequisite: TELT 222.

**MECT 248 INDUSTRIAL AUTOMATION****3.0: 3cr. E/F**

This course covers the following topics: Architecture of a programmable controller, Programming language (LD (Ladder), SFC (Sequential Function Chart), FB (Function Block Diagram), ST (Structured Text)), Input module, digital and analog outputs, driving an electromagnetic load.

Prerequisite: TELT214.

**TECH 250 TRAINING I****4 cr. E/F**

The students should do a training in a company that deals with the field of Mechatronics. At the end of the training students should deliver a report with a presentation describing their work during the training period.

**MECT 252 CONTROL SYSTEMS****3.0: 3 cr. E/F**

In this course, the control of the first and the second order digital linear control systems are studied. The study involves open loop and closed loop discrete analyses, closed loop stability analysis like Nyquist criteria, stability margin and precision of discrete control systems. Also, the course investigates digital controller calculations, PID, syntheses of digital controllers, RST controller, and other practical aspects for digital controllers.

Prerequisite: MATH200A.

**MECT300 MAINTENANCE AND REPAIR II****0.3: 1cr. E/F**

This lab course covers various types of maintenance procedures, including testing, repairing and material handling systems.

**MECT 311 INDUSTRIAL ROBOTS****2.1: 2 cr. E/F**

The course presents the basic components of robotics systems, kinematics for manipulators, selection of coordinate frames, homogeneous transformations, solutions to kinematics equations, Lagrangian equations and manipulator dynamics, motion planning, position, velocity and force control, controller design, digital simulations.

Prerequisite: MECT 221.

**MECT 312 DIGITAL SIGNAL PROCESSING****3.0: 3 cr. E/F**

This course is an introduction to DSP concepts and implementation. It starts by explaining the need for digital signal processing and DSP systems. A complete model of a DSP system is examined from the input transducer, through all the stages including: signal conditioning, anti-aliasing filter, analog-to-digital and digital-to-analog conversion, output smoothing filter, and output transducers. Real life examples will be used to illustrate the use and need for each part of a DSP system.

Pre-requisite: TELT 215, 231.

**MECT 313 MACHINERY****3.1: 3 cr. E/F**

This course teaches an understanding of principles and analysis of electromechanical systems. It covers transformers, AC machinery fundamentals, Synchronous generators, Synchronous motors, transmission lines, and DC motors and generators.

Prerequisite: MECT233

**MECT 314 INDUSTRIAL AUTOMATION II****2.1: 3 cr. E/F**

This course covers the techniques and methods of the supervisory or oversight function in industrial processes, and the technologies for establishing a supervisory system. Topics include the place and role of supervision in businesses, the functions filled by supervision: operation, maintenance, quality, production management, processes and man-machine interfaces, graphic presentations, standardization, configuration and set up of an industrial supervision software system, software interface techniques for the acquisition and sharing of information, coupling of databases and supervision, concepts in remote supervision.

Pre-requisite: MECT 224.

**MECT 315 THERMODYNAMICS****3.0: 3 cr. E/F**

This course presents basic concepts and definitions of thermodynamics. It covers: properties of pure substance, heat, work, first law of thermodynamics, entropy, reversibility and irreversibility, and power and refrigeration cycles.

**MECT 316 MECHANICS OF MATERIALS****3.0:2 cr. E/F**

Fundamental stress and strain relationships, axial stress, safety factors, statically indeterminate axially loaded members, torsion, bending and shear stresses in beams, transformation of stress and strain, combined stresses, deflections in beams, and analysis of columns.

Prerequisite: MECT 211,236,246.

**MECT 317 CAD DESIGN 2****0.2 :1 cr. E/F**

Architectural drawings of residential/commercial/ industrial buildings meeting local specifications. electrical and mechanical views, sectioning, hatching and assembling of mechanical machines and equipment.

Prerequisite: MECT 245.

**MECT 318 SUPERVISORY CONTROL AND DATA ACQUISITION****1.5. 0:1 cr. E/F**

This course provides a comprehensive examination of electric utility supervisory control and data acquisition (SCADA) systems as well as the many adjacent technologies, techniques, and industry best practices that accompany them.

**MECT 319 INDUSTRIAL ROBOTS****3.1: 3 cr. E/F**

The course presents the basic components of robotics systems, kinematics for manipulators, selection of coordinate frames, homogeneous transformations, solutions to kinematics equations, Lagrangian equations and manipulator dynamics, motion planning, position, velocity and force control, controller design, and digital simulations.

Prerequisite: MATH211

**MECT 320 INDUSTRIAL AUTOMATION LAB****0.3: 1 cr. E/F**

This lab course includes graphic presentations, standardization, configuration and set up of an industrial supervision software system, software interface techniques for the acquisition and sharing of information, coupling of databases and supervision, and concepts in remote supervision.

Prerequisite: MECT248 and MECT238.

**MECT 324 RENEWABLE ENERGY****3.0: 3 cr. E/F**

This course covers principles and applications of alternative clean energy sources. Topics include: wind, solar, hydro, biomass, and other systems; mechanisms of renewable power generation, conversion, distribution and utilization.

Prerequisite: MECT313

**MECT 325 FLUID MECHANICS****3.0: 3 cr. E/F**

Topics covered in this course include: fluid properties, fluid statics and manometry, kinematics, basic conservation equations of continuity, momentum and energy, incompressible flows, viscous effects and pipes and restrictions, laminar and turbulent flows, dimensional Analysis and Similitude.

Prerequisite: PHYS205 and (MECT315 or CIVT235)

**MECT 326 FUNDAMENTALS OF MANAGEMENT AND ECONOMICS****2.0: 2 cr. E/F**

This course is organized to contain two major parts: Functions of engineering management, and Economic fundamentals for engineering managers. Part one introduces the basic functions on engineering management such as planning, organizing, leading and controlling, while part two covers the fundamentals of engineering economics.

**MECT 329 ELECTRICAL INSTALLATIONS****2.0: 2 cr. E/F**

Electric wires and cables; wiring systems and techniques; residential and industrial wiring in conformance with the current National Electrical Code and local codes; circuit protection devices; circuits for electric lamps; metering of current, voltage, power and energy.

Prerequisite: MECT 313.

**MECT 330 LABOR LAW****1.5.0: 1 cr. E/F**

Topics covered in this course include: Business Economics, Labor Law, Company Law, Accounting and Business Creation.

**MECT 331 BIOMECHATRONICS****3.0 : 3 cr. E/F**

Biomechatronics is an interdisciplinary science that aims to integrate mechanical elements, electronics and parts of biological organisms. Topics consist of rehabilitation engineering, artificial tissue and organs, implantable neural prosthesis, orthopedic implants and implanted devices, biology-machine interface, minimally invasive surgical instruments, surgical robot, introduces its basic principle, key technology and its development and application. Several lab-oriented assignments and team-based course projects are presented with innovative case studies in diverse application domains. The course will also prepare the students to read literature, understand research problems, and identify possible innovations to the field.

**MECT 332 APPLIED ARTIFICIAL INTELLIGENCE****3.0: 3 cr. E/F**

This course allows students to acquire basic knowledge and implement algorithms and methods of Artificial Intelligence in robotic applications. The course covers concepts ranging over intelligent agents, search algorithms, CSPs to an introduction to supervised and unsupervised learning. A series of lab works, exercises, a set of simulations/projects on computers and robotic platforms, and a set of academic presentations (prepared in part by students) will allow students to better cover the course material, while concurrently developing applied projects. By the end of the course, students should be able to create software and robotic agents with intelligent features.

Prerequisite: CSIS206

**MECT333 ELECTRICAL INSTALLATIONS****3.0: 3 cr. E/F**

Topics covered in this course include: Electric wires and cables; wiring systems and techniques; residential and industrial wiring in conformance with the current National Electrical Code and local codes; circuit protection devices; circuits for electric lamps; metering of current, voltage, power and energy.

Prerequisite: MECT313

**MECT334 IOT PROGRAMMING****3.0: 3 cr. E/F**

This course teaches technology engineers to develop cloud (Web)-based and mobile-based applications that can be used to inter-connect and intra-connect robotic systems via the LAN, WAN and through other IoT mediums. The students will learn how to develop Front-End and Back-End applications. An introduction to databases and online servers is given with implementation use cases. Upon the completion of this course the students will be also able to write APIs and their documentations.

Prerequisite: CSIS206

**MECT335 APPLIED MACHINE LEARNING****3.0: 3 cr. E/F**

This course allows students to acquire basic knowledge and implement algorithms and machine learning techniques in software and robotic applications. The course covers concepts ranging from an introduction to supervised (decision trees, neural nets, SVMs) and unsupervised (K-means, Hierarchical Clustering) learning towards deep learning techniques (CNNs). A series of lab works, exercises, a set of simulations/projects on computers and robotic platforms, and a set of academic presentations (prepared in part by students) will allow students to better cover the course material, while concurrently developing applied projects. By the end of the course, students should be able to create software and robotic agents with intelligent features.

Prerequisite: CSIS206

**MECT336 APPLIED MACHINE LEARNING LAB****1.0: 1 cr. E/F**

This course allows students to implement the AI techniques they acquired from MECT332 Applied ML in different simulations and projects on computers and robotic platforms such as Raspberry Pi and Microcontrollers.

Prerequisite: CSIS206

**MECT 337 APPLIED ARTIFICIAL INTELLIGENCE LAB****1.0: 1 cr. E/F**

This course allows students to implement the AI techniques they acquired from MECT331 Applied AI in different simulations and projects on computers and robotic platforms such as Raspberry Pi and Microcontrollers.

Prerequisite: CSIS206

**TECH 350 TRAINING II****4 cr. E/F**

The students should do a training in a company that deals with the field of Mechatronics. At the end of the training the students should deliver a report that describes their work during the training period.

**MECT 353 HOME AUTOMATION PROTOCOLS****0.3: 1 cr. E/F**

This course covers all aspects of the principles of the KNX protocol used in home automation and includes both theoretical learning, and hands-on programming exercises using the Engineering Tool Software (ETS). Students will understand the principles of the KNX Communication protocol and how to build, configure, diagnose, and examine a KNX system.

Prerequisite: MECT220.

# **BTECH TELECOMMUNICATIONS & NETWORKS** **TECHNOLOGY**

The Bachelor of Technology in Telecommunications and Networks at the University of Balamand enables students to develop and demonstrate understanding of telecommunication theory. Graduates are able to plan, apply and validate telecommunications processes in practice. They will also be able to configure and test networking equipment including digital telecommunication systems and modules.

## **Objectives:**

Our program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in telecommunications or a related field.

Telecommunications graduates are able to demonstrate:

- High capacity for professional success in telecommunications,
- Complete grasp of the theoretical background and practical knowledge required to thrive in the field
- Sufficient preparation for immediate employment.
- Complete mastery of traditional and technological techniques of communication.
- Commitment to lifelong learning, ethical practice and participation in professional societies.

## **Outcomes:**

With a Bachelor of Technology in Telecommunications and Networking Technology, students will acquire the following competencies:

- Ability to model and build telecommunications and/or networking systems and implement these systems.
- Ability to apply technological knowledge and theories for the development of new products.
- Ability to design technology systems using interdisciplinary approach.
- Ability to use the techniques, skills, and modern telecommunications and networking tools necessary for technology practice.
- Ability to function effectively as members of multidisciplinary teams.
- Ability to exhibit skills for lifelong learning.
- Ability to Exhibit knowledge and skills consistent with the expectations of a practicing technologist.

# BTECH – TELECOMMUNICATIONS & NETWORKS TECHNOLOGY

## SEMESTER 1

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
CSIS206	Principles of Programming	3
CSIS218	Computer Skills for Applied Technology	1
ENGL203	English Communications Skills III	3
MATH200A	Calculus I for Technology	3
MECT214	Electrical Circuits	3
MECT216	Electrical Circuits & PCB Lab	1
PHYS205	General Physics	3
<b>Total</b>		<b>17</b>

## SEMESTER 2

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
ENGL2XX	English Elective	3
MECT220	Electronics	3
MECT226	Electronics & PCB Lab	1
MECT228	Advanced Programming	3
TELT214	Logic Design	3
TELT216	Logic Design Lab	1
TELT225	CISCO1: Introduction to Networks	3
<b>Total</b>		<b>17</b>
TECH 250	Training I	2

## SEMESTER 3

<u>Course Code</u>	<u>Course Title</u>	<u>Credit</u>
Elective	TELT247 or TELT258	3
MATH246	Probability	3
TELT246	Applied Optoelectronics	2
TELT251	Microcontrollers	3
TELT254	Analog and Digital Communications	3
TELT255	Telecommunications Lab	1
TELT256	CISCO2: Routing and Switching Essentials	3
<b>Total</b>		<b>18</b>

**SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSPR 201	Cultural & Social Sciences I	3
Elective	TELT352 or TELT242 or CSIS270	3
LISP 200	Library Use & Research Methods	1
MATH 211	Linear Algebra	3
TELT 261	Embedded Systems Lab	1
TELT 264	Mobile Applications Lab	1
TELT266	Fundamentals of Digital Image and Video Processing	3
<b>Total</b>		<b>15</b>
TECH350	Training II	4

**SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSPR 202	Cultural & Social Sciences II	3
Elective	TELT361 or TELT344 or MECT332	3
MECT 245	CAD Design	1
MECT 330	Labor Law	1
TECH 390	Graduation Project: Design Phase	2
TELT 318	Data Center Virtualization, Cloud Infrastructure & IPv6 QoS	1
TELT 333	Operating Systems Lab	1
TELT 362	FPGA	3
<b>Total</b>		<b>15</b>

**SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSPR 203	Cultural & Social Sciences III	3
Elective	TELT312 or TELT366 or TELT329	3
TECH 391	Graduation Project: Implementation Phase	2
TELT 334	Internet of Things	3
TELT 363	Company Telephony	3
TELT 365	Telephony Lab: PABX and DSLLAM	1
<b>Total</b>		<b>15</b>
<b>Total credits</b>		<b>103</b>

## **ELECTIVES**

### **SEMESTER 3**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
TELT 247	Client/Server Programming	3
TELT 258	Wireless Communication	3

### **SEMESTER 4**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
CSIS 270	Databases	3
TELT 242	Information Theory	3
TELT 352	CISCO3: Wireless Essentials and Advanced Routing	3

### **SEMESTER 5**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
MECT 332	Applied Artificial Intelligence	3
TELT 344	Satellites, Antennas and Transmission Standards	3
TELT 361	CISCO4: Connecting Networks MPLS and VXLAN	3

### **SEMESTER 6**

<b><u>Course Code</u></b>	<b><u>Course Title</u></b>	<b><u>Credit</u></b>
TELT312	Web Development	3
TELT329	Cyber Security	3
TELT366	Cellular Networks	3

# COURSE DESCRIPTIONS

## **TELT 214 LOGIC DESIGN**

**3.0: 3cr. E/F**

In this course, basic functions of digital electronics are presented. Topics include: Binary/decimal/Hexadecimal conversion, logic gates, logic functions, sequential systems, counters and registers.

## **TELT 216 LOGIC DESIGN LAB**

**0.3: 1cr. E/F**

A study of basic digital logic circuit design and implementation. Circuit schematic development and computer modeling and simulation of digital systems. Experiments explore designs with combinational and sequential logic.

Corequisite: TELT214.

## **TELT225 CISCO1: INTRODUCTION TO NETWORKS**

**3.0: 3cr. E/F**

This course introduces Data Networking: benefits, topologies, Devices, Communication Protocols and Communication models.

## **TELT 242: INFORMATION THEORY**

**3.0: 3cr. E/F**

This course covers the entropy, relative entropy, mutual information, data compression, Huffman codes, Shannon-Fano-Elias coding, channel capacity, noiseless binary channel, BSC, BEC, AWGN channels, as well as channel coding techniques.

Prerequisite: MATH246-Probabilities.

## **TELT246 APPLIED OPTOELECTRONICS**

**2.0: 2cr. E/F**

This course covers the basics of optoelectronics. First, it gives a review about the wave motion (traveling and standing waves). Then, it presents the electromagnetic waves, the interference, the diffraction and the polarization phenomena. The laws of geometrical optics are reviewed and specially the total internal reflection. This part explains the propagation of light in optical fiber. Finally, the course presents the optical fibers physics, the optical sources, the photodetectors and the optical amplifiers.

## **TELT 247: CLIENT/SERVER PROGRAMMING**

**3.0: 3cr. E/F**

This course aims to improve student's network programming skills. Topics include: client-server architectures, transaction processing, communications, Socket and thread programming in Java and design of applications in the form of objects and relationships. The students are expected to build a Client/Server in Java and design their application level Protocol.

Prerequisite: CSIS206-Principles of Programming.

## **TELT 251 MICROCONTROLLERS**

**3.0: 3cr. E/F**

Topics include: Understanding the architecture of a processor system, controlling the implementation of the concepts of structured programming language C, interfacing a microcontroller with basic sensors and actuators, interfacing devices, managing inputs - digital and analog outputs, and evaluate the time constraints in the case of a simple application.

Prerequisite: CSIS206-Principles of Programming.

## **TELT 254 ANALOG AND DIGITAL COMMUNICATIONS**

**3.0: 3cr. E/F**

This course first focuses on data analog transmission. Modulation techniques are presented: Amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM). Time and frequency multiplexers are also discussed as well as the concept of noise and channel. Then, it covers baseband modulation techniques like PAM, PCM, DPCM and delta modulation, digital signaling formats, TDM, PPM and PWM. Further, the course includes band pass digital modulation techniques like ASK, BPSK, DPSK, FSK, MPSK, QPSK, MSK, spread spectrum systems, and signal-to-noise ratio performance evaluations and comparison

**TELT 255 TELECOMMUNICATIONS LAB****0.3: 1cr. E/F**

This lab provides the foundation education in communication engineering lab analysis and design. Through laboratory, students are provided learning experiences that enable them to analyse and design basic electronic circuits, to carry out AM and FM modulation experiments using specific boards and using computer programs (Pspice and Matlab). In addition, students will be able to design and measure various digital modulation techniques and spread spectrum communication systems using spectrum analyzer. The concepts include SNR, Modulation Index and PCM.

Corequisite: TELT254.

**TELT 256 CISCO2: ROUTING AND SWITCHING ESSENTIALS****3.0: 3cr. E/F**

This course explains the switching concepts and configurations (Hierarchical model, VLANs...), then passes to the Routing concepts: Static vs. Dynamic routing protocols.

Prerequisite: TELT225-CISCO1.

**TELT 258 WIRELESS COMMUNICATION****3.0: 3cr. E/F**

The objective of this course is to present wireless standards like ZigBee, Bluetooth, IEEE 802.11. We are interested in particular on the access methods (CSMA / CA), mobility (CoA), security (WEP, WPA2 ...).

Prerequisite: PHYS205-General Physics.

**TELT 261 EMBEDDED SYSTEMS LAB****0.3: 1cr. E/F**

This Lab constructs a gateway to the embedded systems applications. The students will benefit from their programming knowledge to implement advanced projects using PIC18, Arduino boards and a various set of sensors: infrared, grayscale, ultrasonic, temperature, wheel encoder, Bluetooth and others. In addition, the Input/Output interfaces are tested using push buttons, switches, keypads, 7-segment displays, LEDs, LCDs, GLCDs. At the end, students will be introduced to the raspberry pi mini computer. Then, one or more projects will be implemented on the RPI with a serial communication with an Arduino board.

Prerequisite: TELT251-Microcontrollers.

**TELT 264 MOBILE APPLICATIONS LAB****0.3: 1cr. E/F**

Topics include: install and configure Android application development tools, design scripts to meet given interface and media control requirements, develop high-level plans for script solutions for mobile and evaluate the post-production outcome, carry out and evaluate functional test strategies of mobile design, implement and evaluate techniques for the installation of mobile applications and delivery via various channels, explain the principles of technologies which support media production and delivery on a variety of platforms.

Prerequisite: CSIS206-Principles of Programming.

**TELT 266 FUNDAMENTALS OF DIGITAL IMAGE AND VIDEO PROCESSING****3.0: 3cr. E/F**

This course introduces the fundamentals of 2D signals and systems. Topics include complex exponential signals, linear space-invariant systems, 2D convolution, and filtering in the spatial domain. Then 2D signals in the frequency domain are introduced. Topics include: 2D Fourier transform, sampling, discrete Fourier transform, and filtering in the frequency domain. Then this course will cover the fundamentals of image and video processing. It will provide a mathematical framework to describe and analyze images and videos

as two-dimensional and three-dimensional signals in the spatial, spatio-temporal, and frequency domains. Finally, several important image and video processing applications are covered: motion estimation, color representation and processing, image and video enhancement and Image and video compression. In addition, the student will also learn how to perform these key processing tasks in practice using state-of-the-art techniques and tools.

Prerequisite: MATH200A-Calculus I for Technology.

**TELT 312 WEB DEVELOPMENT****3.0: 3cr. E/F**

This course teaches the concept of Web Development. The main objective is to create static and dynamic Websites. At the end of this course, students will be able to design and implement a professional website, author web pages using HTML, make stylistic decisions with CSS, Create interactive websites with JavaScript and Use PHP for server programming.

**TELT 318 DATA CENTER VIRTUALIZATION & CLOUD INFRASTRUCTURE****0.3: 1cr. E/F**

This course is designed to provide students with essential knowledge and skills to learn how to manage data centers using virtualization. It provides an overview on how to implement IPv6 networks: addressing, subnetting and routing protocols and how to implement the Resource Reservation Protocol (RSVP) as part of the integrated services approach that provides QoS to individual applications or flows.

Prerequisite: TELT225-CISCO1.

**TELT 329 CYBER SECURITY****3.0: 3cr. E/F**

This course covers authentication and access control, integrity and confidentiality of data, database security, routing, firewalls intrusion detection/prevention, trusted operating systems, in addition to virtual private networks, web security, and industrial controls. The course examines threats and vulnerabilities to specific architectures and protocols, computer forensics and other security-related topics of current relevance.

Prerequisite: TELT225-CISCO1.

**TELT 333 OPERATING SYSTEMS LAB****0.3: 1cr. E/F**

The aim of this course is to give the ability to manage Windows Server 2012 operating system, perform Hyper V on the virtualization process, install and configure a DHCP server and distribute configuration in TCP/IP, install and configure different windows servers: Web, DNS, SMTP, RD... Install, configure, and manage a Linux servers and relevant services and applications.

Prerequisite: TELT225-CISCO1.

**TELT 334 INTERNET OF THINGS****3.0: 3cr. E/F**

Topics include: understand the definition and significance of the Internet of Things, perform the IoT Microcontrollers/Sensors/Actuators utilization and data collection, explore the wireless communications technologies used in IOT devices, discover various IOT platforms and cloud services used in IOT applications, implement a Multi-Node IoT solution and discuss the architecture, operation, and business benefits of an IoT solution.

Prerequisite: TELT251-Microcontrollers.

**TELT 344 SATELLITES, ANTENNAS AND TRANSMISSION STANDARDS****3.0: 3cr. E/F**

The aim of this course is to recognize the concept of satellite communications, identify the different segments of satellite communications, frequencies and orbits, recognize the transmission characteristic of antennas, classify their types, and perform power link budget, identify the appropriate modulation technics as well as the multiple access technics for different satellite applications, setup and configure a VAST following the actual satellite transmission standards.

Prerequisite: TELT254-Analog and Digital Communications.

**TELT 352 CISCO3: Wireless Essentials and Advanced Routing****3.0: 3cr. E/F**

This course focuses on switching technologies and router operations that support small-to-medium business networks, including wireless local area networks (WLAN) and security concepts. In this course you'll perform basic network configuration and troubleshooting, identify and mitigate LAN security threats, configure and secure a basic WLAN and configure and troubleshoot VLANs, Wireless LANs and Inter-VLAN routing.

Prerequisite: TELT225-CISCO1.

**TELT 361 CISCO4: CONNECTING NETWORKS MPLS and VXLAN****3.0: 3cr. E/F**

This course gives and explains the different scenarios and methods to connect a branch to the Internet and to connect different branches between them including DSL, Frame Relay, ATM, MPLS ...etc.

Prerequisite: TELT225-CISCO1.

**TELT 362 FPGA****3.0: 3cr. E/F**

Topics include: Different types of ASIC, FPGA, VHDL language applied to the combinational and sequential logic, Specification of digital systems, digital circuits' synthesis, functional simulation / time.

Prerequisite: TELT214-Logic Design.

**TELT 363 COMPANY TELEPHONY****3.0: 3cr. E/F**

The aim of this course is to highlight the principle of a company telephony system. Topics include: compare features of ToIP network and PSTN., use the main telephone services offered by posts and PABX, analyze and evaluate commercial offers of access to public telephone networks, describe the basic operation and components used in a VoIP Network, identify call signaling and media stream flow, know how to size a private IP telephony network (ToIP) and operate and maintain a network of ToIP.

Prerequisite: TELT225-CISCO1.

**TELT 365 TELEPHONY LAB: IPT vs PABX vs FTTH****0.3: 1cr. E/F**

This Lab aims to first size, install, configure, and maintain a private telephone network (switching, signaling, services, cabling standards, wired stations, DECT) and then wire, configure and activate a PABX. Furthermore, it aims to insert IP stations on a hybrid PABX, IP links between hybrid PABX modalities, implement a basic VoIP network and follow safe workplace procedures relevant to voice & video over IP networks. Then, identify VoIP technologies such as IP PBX, configure IP telephony, handset, call control, and voicemail solutions.

Corequisite: TELT363-Company Telephony.

**TELT 366 CELLULAR NETWORKS****3.0: 3cr. E/F**

This course presents the different technologies in mobile networks. Topics include: cellular networks and wireless communication systems, the radio-mobile channel, GSM system, GPRS, third generation systems (3G) as well as fourth generation systems (4G).

Prerequisite: TELT254.

## **COMMON IFFT COURSES**

### **TECH250: TRAINING 1**

**2 cr. E/F**

The students should do a training that is related to business or finance. At the end of the training, students should deliver a report that describes their work during the training period.

### **TECH350: TRAINING 2**

**4 cr. E/F**

The students should do a training that is related to business or finance. At the end of the training the students should deliver a report that describes their work during the training period.

Prerequisite: TECH250

### **TECH390 GRADUATION PROJECT DESIGN**

**2 cr. E/F**

First of two consecutive semesters devoted to a team project that engages students in a complete process of technical design. In this course, students will work as a team. They will investigate a specific problem, explore appropriate solutions to meet project requirements, provide cost analysis, and develop a prototype. At the end of the semester, student must submit a written end-of-semester report and make an oral presentation for review.

### **TECH391 GRADUATION PROJECT IMPLEMENTATION**

**2 cr. E/F**

Continuation of the graduation project design of the previous semester. During this semester, students will implement the solutions proposed in the previous semester. Final results will include a prototype software/hardware design solution that meets the project requirements, including final testing of the solution. At the end of the semester, students must submit a written end-of-semester report and make an oral presentation for review.

## **SERVICE COURSES**

**For the course description of the below listed courses:**

**BIOL, CHEM, CSPR, CSIS, LISP, MATH, PHYS**

Refer to the Faculty of Arts and Sciences.