

**Faculty of Engineering,
Architecture and Built
Environment
SKILL SETS**

Programme: B.Eng. (Hons.) Communication & Electronic Engineering

Co-op Level	Student Capabilities	Student Limitations	Expectations/Requirements of Co-op Job
Level 1	Basic Sciences : Biology, Mathematics, Chemistry I & II	Microbiological techniques	Exposure to Biotech laboratory or industrial environment
	Human Physiological Sciences I	Molecular Cell Biology	Some hands on exposure to biotechnological techniques
	Structural Biochemistry	Metabolic Biochemistry	Opportunity to be part of a team to carry out an R&D or production project, under guidance and supervision
	Basic Computer Programming	Pharmacology	Opportunity to be part of a team to carry out an R&D or production project, under guidance and supervision
	Conduct analysis and testing of advanced circuits	Numerical analysis related problems	Become more familiar with manufacturing and industrial environments
	Carry out more complicated engineering calculations	Data Communication and Networking	To be able to use what they learned in terms of design analysis, calculations and software
	Use software (e.g. Pspice, Matlab, Microstation ...etc.) for simulation and analysis	Deal With Microprocessors and Microcontrollers	
	Design a simple circuit and its PCB	Advanced digital and Analogue circuit designs	
	Programming using C++		
	Engineering drawing		
Power circuits analysis			

Programme: B.Eng. (Hons.) Communication & Electronic Engineering

Co-op Level	What student can do:	What student cannot do:
Level 1	Microscopy	Microbiological technique
	Dissection of small mammals, amphibians	Molecular cell biology technique
	Basic and applied calculus & analytical geometry	
	Volumetric experiments	
	Molar concentrations of solutions	
	Chemical equilibrium & kinetics	
	Reduction –oxidation reactions and applications	
	Sketching and drafting of technical Engineering designs	Similar to the above
	Design and simulate moderate digital and analogue circuits.	
	Write and develop algorithms and programmes using C++	
	Some costing Break even analysis	
	Analyse three phase circuits, transformers, and simple power electronic circuits	

Programme: B.Eng. (Hons.) Communication & Electronic Engineering

Co-op Level	Student Capabilities	Student Limitations	Expectations/Requirements of Co-op Job
Level 2	Numerical analysis	Numerical analysis related problems	To get more hands-on experience in circuit design and fabrication
	Advanced analogue electronics	Data Communication and Networking	Be able to develop programmes and algorithms to be used for Microprocessors for industrial and manufacturing purposes
	Advanced digital electronics	Deal With Microprocessors and Microcontrollers	To get more knowledge about current Data networking systems
	Communication theory	Advanced digital and Analogue circuit designs	Learn how to optimize their design to minimize EMI effects
	Data communication and Networks.		Get to learn more about software used for Design and simulation for industrial environment
	Microprocessors		Improve their writing skills and reporting of their observations when conducting a measurement or testing
	Design / Simulate communication circuits, including power amplifiers, modulators...etc		To conduct some R&D work in preparation for the final year project
	Electromagnetic waves properties, devices		At this level student is expected to perform fully as an engineer under training.
	Digital signal processing		More emphasis should be given to work aspects such as teamwork, and engineering good practices.
	Further investigation about more advanced communication systems		To come out with solutions and think independently with little supervision, i.e. student will be given tasks to be carried out by him.
	Advanced electronic circuit design		
	Analytical techniques for high frequency circuits		
	Design and realization of passive and active sub systems, e.g. directional couplers, T.L. filter design		
	Develop an Embedded system design		
	Antennas and Electromagnetic compatibility		
	Microwave systems design		
	Optical Communication		
Advanced digital systems			
Research capabilities			

Programme: B.Eng. (Hons.) Communication & Electronic Engineering

Co-op Level	What student can do:	What student cannot do:
Level 2	Numerical differentiation, integration, and produce solutions of algebraic equations	
	Design filter, oscillators, and Operational Amplifier circuits	
	Design of Finite state machines, and using of logic families TTL, NMOS, PMOS and programmable logic devices	
	Work with Different modulation schemes for AM, FM, ASK, FSK, and PSK circuits analysis	
	Use measurements transducers and design conditioning circuits for that purpose	
	Use Microprocessors and develop programmes specifically for MC68K series	
	Choose filter structure and realize it using a DSP and predict it is performance.	
	Very good skills in writing and reporting problems	
	Use of Microcontrollers for embedded system designs such as PIC micro-controllers.	
	Using of HDL for digital designs and synthesis	
	Calculate the effect of EMI and apply good design practices.	
	Capability of conducting R&D work.	
	Use software in Microwave design, e.g. Microwave office & Wave maker.	
Analyse optical communication systems		

Programme: B.Eng. (Hons.) Electrical & Electronic Engineering

Co-op Level	Student Capabilities	Student Limitations	Expectations/Requirements of Co-op Job
Level 1	Report Writing skills	Handling High Power Circuits	An introduction to the industrial / office environment
	Analysis of simple circuits	Simulation and Analysis of Complicated Circuits Programming	To learn about available software and manufacturing process
	Take readings using common measuring instruments	Numerical analysis related problems	Become more familiar with manufacturing and industrial environments
	Carry out Engineering calculations at moderate level	Data Communication and Networking.	To be able to use what they learned in terms of design analysis, calculations and software
	Conduct analysis and testing of advanced circuits	Deal With Microprocessors and Microcontrollers	
	Carry out more complicated engineering calculations	Advanced digital and Analogue circuit designs	
	Use software (e.g. Pspice, Matlab, Microstation ...etc.) for simulation and analysis		
	Design a simple circuit and its PCB		
	Programming using C++		
	Engineering drawing		
Power circuits analysis			

Programme: B.Eng. (Hons.) Electrical & Electronic Engineering

Co-op Level	What student can do:	What student cannot do:
Level 1	Prepare report documentation	Deal with high power circuit elements
	Conduct simple testing & analysis on electronic low power circuits	Design complex circuits Programming
	Sketching and drafting of technical Engineering designs	Similar to the above
	Design and simulate moderate digital and analogue circuits	
	Write and develop algorithms and programmes using C++	
	Some costing Break even analysis	
	Analyse three phase circuits, transformers, and simple power electronic circuits	

Programme: B.Eng. (Hons.) Electrical & Electronic Engineering

Co-op Level	Student Capabilities	Student Limitations	Expectations/Requirements of Co-op Job
Level 2	Numerical analysis		To get more hands-on experience in circuit design and fabrication
	Advanced analogue electronics		Be able to develop programmes and algorithms to be used for Microprocessors for industrial and manufacturing purposes
	Advanced digital electronics		To get more knowledge about current Data networking systems
	Communication theory		Use and run tests on Electrical machines and power components
	Data communication and Networks		Get to learn more about software used for Design and simulation for industrial environment.
	Microprocessors		Improve their writing skills and reporting of their observations when conducting a measurement or testing.
	Measurements and instrumentations		To conduct some R&D work in preparation for the final year project
	Electrical Machines		
	Digital signal processing		
	Power electronics applications and elements		
	Advanced electronic circuit design		
	Design of Control system for an electric process		
	Power systems elements and power flow		
	Develop an Embedded system design		
	VLSI technologies		
Advanced digital systems			
Research capabilities			

Programme: B.Eng. (Hons.) Electrical & Electronic Engineering

Co-op Level	What student can do:	What student cannot do:
Level 2	Numerical differentiation, integration, and produce solutions of algebraic equations	
	Design filter, oscillators, and Operational Amplifier circuits	
	Design of Finite state machines, and using of logic families TTL, NMOS, PMOS and programmable logic devices	
	Work with Different modulation schemes for AM, FM, ASK, FSK, and PSK circuits analysis	
	Use measurements transducers and design conditioning circuits for that purpose	
	Use Microprocessors and develop programmes specifically for MC68K series	
	Run, operate and test electrical machines such as induction, synchronous, DC machines	
	Choose filter structure and realize it using a DSP and predict it is performance	
	Simulate and Design power electronic circuits	
	Manufacturing yields estimation using statistical and Non statistical methods	
	Produce dynamic characteristics of first and second order control systems	
	Perform analysis for control systems using Matlab / Simulink	
	Very good skills in writing and reposting problems	
	Capable of performing power flow analysis on power systems.	
	Use of Microcontrollers for embedded system designs such as PIC micro-controllers	
Design of VLSI sub systems using CAD tools		
Using of HDL for digital designs and synthesis		

Programme: B.Eng. (Hons.) Mechatronic Engineering

Co-op Level	Student Capabilities	Student Limitations	Expectations/Requirements of Co-op Job
Level 1	Report Writing skills	Handling High Power Circuits	An introduction to the industrial / office environment
	Analysis of simple circuits	Simulation and Analysis of Complicated Circuits	To learn about available software and manufacturing process
	Take readings using common measuring instruments	Programming	Hands-on experience using CAD tools for mechanical drawing.
	Carry out Engineering calculations at moderate level		Analyze dynamic problems using linear and curvilinear coordinate systems
	Mechanical drawing	Numerical analysis related problems	Become more familiar with manufacturing and industrial environments.
	Solve and analyse static related problems	Data Communication and Networking.	Be able to use what they learned in terms of design analysis, calculations and software.
	Conduct analysis and testing of moderate level circuits	Using Microprocessors and Microcontrollers.	Become familiar with mechanical systems, use flow equations determine the size of a pipe for a specific flow rate
	Carry out more complicated engineering calculations	Advanced digital and Analogue circuit Analysis and design.	Apply first and second law of thermodynamics
	Use software (e.g. Pspice, Matlab...etc.) for simulation and analysis		Become familiar with applications involving fluid power systems, fluid distributions systems, pumps, turbines, valves, elbows, and other fittings
	Design a simple circuit and its PCB		
	Programming using C++		
	Calculate and use flow equations, pressure drop across pipes computing the amount of energy loss due to friction in a fluid flow system by characterizing the nature of the flow		

Programme: B.Eng. (Hons.) Mechatronic Engineering

Co-op Level	What student can do:	What student cannot do:
Level 1	Prepare report documentation	Deal with high power circuit elements
	Conduct simple testing & analysis on electronic low power circuits	Design complex circuits
	Design mechanical models and miniatures using CAD	Programming
	Sketching and drafting of technical Engineering designs	Advanced level mechanical design and Analysis
	Design and simulate moderate digital and analogue circuits	Design and Analysis of mechanical engineering systems
	Write and develop algorithms and programmes using C++	
	Some costing Break even analysis	
	Analyze three phase circuits, transformers, and simple power electronic circuits	
	Use the energy equation to predict flow characteristics, pressure drop across pipes, fittings, flow meters and networks	
	Design an open channel to transmit a given discharge with uniform flow	

Programme: B.Eng. (Hons.) Mechatronic Engineering

Co-op Level	Student Capabilities	Expectations/Requirements of Co-op Job
Level 2	Numerical analysis	To get more hands-on experience in circuit design and fabrication
	Advanced analogue electronics	To be able to develop programmes and algorithms to be used for Microprocessors for industrial and manufacturing purposes
	Advanced digital electronics.	To get more knowledge about current Data networking systems
	Data communication and Networks	To use and run tests on Electrical machines and power components
	Microprocessors	Get to learn more about software used for Design and simulation for industrial environment
	Measurements and instrumentations.	To improve their writing skills and reporting of their observations when conducting a measurement or testing
	Electrical Machines.	To design columns under axial and eccentric loadings at different fixing end conditions
	Control and Mechatronics	To use of tables to find centroids and moments of inertia for different composite shapes
	Elastic and plastic deformations	To become more familiar with using measuring instruments and devices.
	Different types of loading in members and columns	To conduct some R&D work in preparation for the final year project
	Perform analysis of stress and strain in members made of different materials	To perform fully as an engineer under training
	Power electronics applications and elements.	More emphasis should be given to work aspects such as teamwork, and engineering good practices
	Develop an Embedded system design	To come out with solutions and think independently with little supervision, i.e. student will be given tasks to be carried out by him.
	Advanced digital systems	To gain knowledge of making use of and integrates the fundamental concepts toward the goal of analysing and designing mechanical elements to achieve satisfactory levels of preserving function, safety, reliability, competitiveness, usability, manufacturability, and marketability
	Design and operate a robotic system	To examine and use specific mechanical elements such as fasteners, weldments, adhesives, springs, bearings, gears, clutches, brakes, shafts, belts, chains, and specifically addresses analysis, selection, and design
	Perform calculations for safe designs of machine elements	To use hydraulic systems in terms of structure, flow in pipelines, source of power, actuators and motors, valves and other control components, circuit design, and maintenance
	Suggest the proper manufacturing process for the production of a given item	o use numerical control and CAD/CAM, industrial robot and logic control systems, teaching robot to do work, logic diagramming
	Suggest heat treatments for the materials affected during the manufacturing processes	
	Choose among available cold working processes	
Draw cash flow diagrams for different economic problems Research capabilities		
Using income tax tables to find tax effects on economic problems		

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Co-op Level	What student can do:	What student cannot do:
Level 2	Numerical differentiation, integration, and produce solutions of algebraic equations.	
	Design filter, oscillators, and Operational Amplifier circuits	
	Design of Finite state machines, and using of logic families TTL, NMOS, PMOS and programmable logic devices.	
	Use measurements transducers and design conditioning circuits for that purpose.	
	Use Microprocessors and develop programmes specifically for MC68K series.	
	Run, operate and test electrical machines such as induction, synchronous, DC machines.	
	Decisions about the safe use of members in mechanical systems	
	Drawing the Mohr's circle for any member under combined stresses and find the maximum tensile and shear stresses.	
	Simulate and Design power electronic circuits	
	Manufacturing yields estimation using statistical and Non statistical methods	
	Produce dynamic characteristics of first and second order control systems.	
	Perform analysis for control systems using Matlab/Simulink.	
	Very good skills in writing and reporting problems	
	Use of Microcontrollers for embedded system designs such as PIC microcontrollers.	
Using of HDL for digital designs and synthesis.		
Robot Languages and Programming Classification of robot languages, computer control and robot software		