BEng (Hons) Mechatronics Engineering - E441 (Under Review)

1.0 Introduction

The BEng (Hons) Mechatronics Engineering programme is a 4-year full-time course and has been designed to meet the educational requirements for graduates to practice as a professional Engineer in the public, parastatal and private sector organisations subject to satisfying the pre-registration requirements of the Council of Registered Professional Engineers of Mauritius (CRPE).

The Programme offers both theory and laboratory work designed to enable the students to understand the principles underlying the application of intelligent controllers in the control of machine components. The knowledge and skills gained will be useful to deal with a broad range of engineering products such as robotics, automated production systems, consumer goods, process control amongst others. The scheme of study also offers adequate background for further studies/research at graduate level and beyond both locally and abroad.

The students are given the basic tools to allow the modelling, analysis and control of complex system without physically building and testing the actual system, which may be expensive. This provides the students with a blend of technologies, which will provide the most economic, elegant, and appropriate solution to the problem at hand.

There are various categories of modules such as: basic engineering, mathematics, electronics, electrical engineering, mechanical engineering, automation and robotics, and safety engineering. They are not limited to a single industry and the engineers can adapt easily to any industry, which require their expertise. The job prospect is very wide for the graduates with a BEng (Hons) in Mechatronics Engineering. Some of the sectors where their expertise are sought are maintenance (of manufacturing systems, tourism industry, para-statal bodies, cane industry), design and implementation of automation systems, sales of equipment, security systems, building services and many others. Graduates have also been hired by major ICT companies.

The programme has been designed to meet the competency standards prescribed by engineering bodies forming part of the Washington Accord for recognition of qualifications and international mobility of engineers.

2.0 Objectives

Upon completion of this programme students should be able to:

- Use a range of tools and technique to design, develop, implement, and improve integrated systems that include people, materials, information, equipment, processes and plants.
- Design and conduct experiments and simulation for the purpose of process optimization.
- Embark on a career associated with the design and management of industrial automation systems.
- Demonstrate professional responsibility and ethics for the practice of engineering.

3.0 General Entry Requirements

As per General Entry Requirements for admission to the University of Mauritius for Undergraduate Degrees.

4.0 Programme Requirements

- GCE ‘A’ Level Passes in Mathematics and Physics.
- Pass at ‘O’ Level Chemistry.

5.0 Minimum Requirements for Degree Award

The award of the degree is subject to the student satisfying the following requirements:

- Successful completion of **604** notional hours credits (151 UoM Credits) as per the programme structure;
- Satisfactory completion of industrial placements and practical workshop training as specified in the programme;
- Satisfactory performance in each of the eleven Graduate Attributes (GAs) specified against modules in the module specification sheets.

The programme has been formulated to meet the competency standards prescribed by the Washington Accord. This means that graduates from this programme would, in addition to satisfying the prescribed credits per knowledge area (natural sciences, mathematics, engineering sciences, design and synthesis, and complementary studies), also have demonstrated satisfactory performance in the following eleven Graduates Attributes (GAs):

GA 1: Problem Solving
GA 2: Application of scientific and engineering knowledge
GA 3: Engineering Design
GA 4: Investigations, experiments and data analysis
GA 5: Engineering methods, skills and tools, including Information Technology
GA 6: Professional and technical communication
GA 7: Impact of engineering activity
GA 8: Individual, team and multidisciplinary working
GA 9: Independent learning ability
GA 10: Engineering Professionalism
GA 11: Engineering Management

6.0 Programme Duration

	Normal	**Maximum**
Degree:	4 years	7 years

7.0 Classification of Awards

The award classification will be based on the CPA (x) at the end of the Programme of Studies as follows:

CPA	**CLASSIFICATION**	
≥ 70	1st Class	with Honours
$60 \leq x < 70$	2nd Class 1st Division	
$50 \leq x < 60$	2nd Class 2nd Division	
< 50	No Award	

Note: The general University Regulations pertaining to Exit Points are not applicable to this programme.

8.0 Pre-Requisite Modules (PR)

A student will be allowed to follow module **y** of which module **x** is a *pre-requisite* (PR) provided he/she has satisfactorily completed module **x** with at least a pass grade.

9.0 Assessment and Pass Requirements

The assessment mode for each module will be based on one or a combination of the following:

- Examination
- Continuous assessment
- Mini projects
- Practical and other reports
- Presentations
- Attendance to seminars

16 notional hours credits modules shall have 3-hour examination papers. 12 or 8 notional hours credits modules shall have 2-hour examination papers.

In order to pass a module a student must obtain an examination mark of at least 40% and a final mark of at least 50%.

Calculation of the final mark: The continuous assessment must account for no less than 30% and for no more than 50% of the final mark, with the exception of modules like design and research projects. Certain modules are assessed on the basis of 100% Continuous Assessment. The specific details and/or formula for the calculation of the final mark are given in the Module Specification Sheet (MSS) of each module.

Students have to retake both continuous assessment and exams in the failed module except in case of Resit Examinations; See provisions for Resit Examinations at Section 10. Students passing failed modules will score maximum marks of 50% in these modules but will have the failed marks not counted in the computation of the CPA.

If the student's CPA is between 40 and 50, he/she fails the year, but can repeat the year, will maintain credits and marks for individual modules where the mark is 50% or above. If the CPA is less than 40, the registration will be terminated.

Rules in Cases of Unsatisfactory Performance of Graduate Attributes (GAs)

The GAs and assessment criteria are specified against modules in the Module Specification Sheets (MSS).

A student must comply with the subminimum requirements in subdivisions of certain modules. For such modules these specific requirements are given in the MSS of the module. These sub-minima include the achievement of GAs that are assessed in the module. A subminimum mark of 50% is required for all assessment elements (relevant questions in an assessment, project or assignment) in which the achievement of graduates attributes are assessed (for the particular module).

The following rules will apply in cases of unsatisfactory performance of GAs.

(i) GAs assessed in the written examination.
A student failing the assessment of a GA in an examination will be deemed to have failed the module. The student will have to retake the module next time it is offered. Special retake examinations will not apply to these modules.

(ii) GAs assessed in coursework, e.g., mini-project work.
A student not satisfying a GA may be given an extension by the lecturer and moderator prior to the examination to amend and resubmit the coursework for pass mark of 50 % only. In case the student still fails to satisfy the GA in the re-submission, he/she will be awarded Grade N in the module and will have to

do a new coursework in the next academic year, provided he/she has scored a minimum of 50 % in the overall module mark.

In case a student fails the module, that is, scored less than 50 % in the overall module mark, he/she will be awarded Grade F and has to retake the whole module the next time it is offered.

(iii) GAs (other than GA6) assessed in the Final Year Project.

If a candidate fails to obtain a pass mark of 50 % for any GA (other than GA 6) in the Final Year Project, the Board of Examiners may consider one of the following:

- For a project/dissertation with possibility of amendments, award the student Grade N in the module and grant the student an extension period of up to 3 months to amend the work related to the GA, and resubmit for pass mark of 50 % in the GA;
- For a project/dissertation with recommendations for a new submission, award the student Grade F in the module and request the student to undertake a new project in the following academic year.

(iv) GA 6 assessed in the Design Project and/or Final Year Project.

For a student failing to obtain the pass mark of 50 % for GA 6 in the Design Project or Final Year project, the Board of Examiners may consider awarding the student Grade N and granting the student an extension period of up to 3 months to amend the components of the work related to this GA, and resubmit for a pass mark of 50 % in the GA, provided that the student has scored a minimum of 50 % in the overall module mark.

In case a student fails the module, that is, scored less than 50 % in the overall module mark, he/she will be awarded Grade F and has to retake the whole module the next time it is offered.

(v) GA 3 assessed in the Design Project.

A student failing GA 3 will be awarded Grade F in the module and will have to retake the module the next time it is offered.

The detailed assessment mode for each module is given in the MSS.

10.0 Resit Examinations

If a student obtains a CPA of at least 50 but has not passed all the modules, a Resit examination may be granted for failed modules by the Board of Examiners provided that:

(i) A minimum of 40% has been obtained in continuous assessment.
(ii) A Final mark of at least 40% has been achieved in the failed modules which exclude assessment of GAs;
(iii) A pass mark has been achieved but the required sub minimum for passing a Graduate Attribute (GA) has not been obtained.

Resit examinations do not apply to final year Project/Dissertation/Mini-Project Portfolio/Industrial Training and to modules assessed solely by continuous assessment.

11.0 Duration of examinations

- 16 credits modules shall have 3-hour examination papers.
- 12 credits and 8-credits modules shall have 2-hour examination papers.

12.0 Termination of Registration

Termination of registration will occur in the following circumstances:

- If the CPA is less than 25 at the end of Semester 1, Level 1.
- If the CPA is less than 40 at the end of an academic year.
- If the student fails to obtain credit in a module which he/she is repeating.
- If the student does not pass all the modules for 1st, 2nd and 3rd years in a total of five years.

13.0 Progression from lower level to higher level

First Year to Second Year
A student cannot fail more than two modules to be able to register for Second Year modules. If any of the failed modules is a Pre-requisite(s) for a Second Year module, then the candidate cannot register for the affected Second Year module until the Pre-requisite(s) is passed.

Second Year to Third Year
A student **must** have passed all prescribed First Year modules. In addition, the student cannot fail more than two modules of the prescribed second year modules to be able to register for Third Year modules. If any of the failed modules is a Pre-requisite(s) for a Third Year module, then the candidate cannot register for the affected Third Year module until the pre-requisite is passed.

Third Year to Fourth Year
A student **must** have passed all prescribed second year modules. In addition, the student cannot fail more than two modules of the prescribed **Third Year** modules to be able to register for Fourth Year modules. If any of the failed modules is a pre-requisite for a Fourth Year module, then the candidate cannot register for the affected Fourth Year module until the pre-requisite is passed.

Note: If a student is not proceeding to the next level, s/he is deemed to repeat the year, even if the CPA ≥ 50.

14.0 Registration for Modules in a Higher Year of Study for Repeating Students

If a student is repeating a year and the CPA is above 45, the student may be allowed to register for a maximum of two modules per semester from the higher year of study. The student will need to make a request to the Dean of Faculty. The student cannot register for a module of a higher year of study if a timetable clash occurs with a module of a previous year which has not yet been passed and which is prescribed for his or her field of study. Moreover, registration for modules is subject to pre-requisites being met.

15.0 Self-Development (SD)

This refers to directly supervised work in terms of hours/week. It includes practicals, tutorials, seminars, visits, mini-projects, oriented-discussion, coached group-work, presentations and other structured activities associated to enhancing the engineering application abilities and professional and personal attributes of the students. Such supervised work is included in the time-table.

16.0 BEng (Hons) Mechatronics Engineering Programme Structure

Year 1 – Semester 1

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 1107(1)	Engineering Drawings	1+2	2	8	
MATH 1162(1)	Mathematics for Engineers 1	3+2	4	16	
PHYSI 1111(1)	Physics for Engineers1	3+2	4	16	
CHEM 1103(1)	Chemistry for Engineers	3+2	4	16	
ENGG1103(1)	Professional Communication for Engineers	2+2	3	12	
ELEC 1116(1)	Programming for Mechatronics Engineers 1	1+2	2	8	
MECH 1104	Industry Seminar				
			19	**76**	

Year 1 – Semester 2

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
ENGG 1202(1)	Materials Science and Engineering	3+2	4	16	
MATH 1262(1)	Mathematics for Engineers 2	3+2	4	16	
PHYSI 1212(2)	Physics for Engineers 2	3+2	4	16	
MECH 1210(1)	Introduction to Mechanics	3+2	4	16	
SOCI 1207(1)	Contemporary Society and Development	1.5+1	2	8	
ELEC 1216(1)	Programming for Mechatronics Engineers 2	1+2	2	8	
MECH 1207	Practical Workshop Training 1				
			20	**80**	

Year 2 – Semester 1

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 2103(3)	Dynamics	3+2	4	16	
MECH 2106(3)	Strength of Materials	3+2	4	16	
ELEC 2119(3)	Digital Systems	2+2	3	12	
ELEC 2111(3)	Analog Electronics 1	2+2	3	12	PHYSI 1212(2)
ELEC 2114(3)	Electrical Circuits	3+2	4	16	PHYSI 1212(2)
MATH 2163(3)	Mathematics for Engineers 3B	1.5+1	2	8	
			20	**80**	

Year 2 – Semester 2

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 2212(3)	Mechanical Design 1	3+2	4	16	
MECH 2205(3)	Occupational Health and Safety	1.5+1	2	8	
ELEC 2201(3)	Microprocessors and Microcontrollers	3+2	4	16	
ELEC 2203(3)	Instrumentation and Measurement 1	1.5+1	2	8	
ELEC 2205(3)	Electrical Machines	3+2	4	16	PHYSI 1212(2)
MECH 2213(3)	Thermodynamics & Fluids	3+2	4	16	
MECH 2214	Practical Workshop Training 2				
			20	**80**	

Year 3 – Semester 1

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 3116(5)	Fluid Power and PLC	3+2	4	16	
ELEC 3119(5)	Systems and Control 1	3+2	4	16	ELEC 2114(3)
MECH 3117(5)	Mechatronics System Design 1	1+4	3	12	
MECH 3107(5)	Project Management	1.5+1	2	8	
ELEC 3121(5)	Power System	3+2	4	16	
			17	**68**	

Year 3 – Semester 2

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 3204(5)	Experimentation and Investigations	3+2	4	16	
CHE 3211(5)	Environmental Management	1.5+1	2	8	
MATH 3281(5)	Mathematics for Engineers 4B	3+2	4	16	
ELEC 3213(5)	Electrical Drives	2+2	3	12	
ELEC 3214(5)	Systems and Control 2	2+2	3	12	ELEC 3119(5)
MECH 3212(5)	Mechatronics System Design 2	0+8	4	16	
MECH 3201	Industrial Placement (12 Weeks)				
			20	**80**	

Year 4 – Yearly Module

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 4000Y(5)	Project	0+12	12	48	

Year 4 – Semester 1

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 4108(5)	Intelligent Machine	2+2	3	12	
MECH 4109(5)	Fluid Mechanics and Machines	2+2	3	12	
ENGG 4102(5)	Sociology for Engineers	1+2	2	8	
ELEC 4126(5)	Process Control Engineering	2+2	3	12	ELEC3119(5)
			11	**44**	

Year 4 – Semester 2

Module Code	Module Name	Hours/ Week L+SD	UoM Credits	Notional Hours Credits	Pre-Requisite
MECH 4210(5)	Industrial Robotics	2+2	3	12	
MECH 4201(5)	Engineering Professionalism	1.5+1	2	8	
ELEC 4217(5)	Renewable Energy Integration	3+2	4	16	
MECH 4212(5)	Industrial Automation and IoT	2+2	3	12	
			12	**48**	

Total Notional hours credits = 604
Total UoM Credits = 151