

# **BS in Systems Engineering minor Engineering Management or minor Industrial Engineering – E446**

## **1.0 Introduction**

The University of Mauritius (UoM) and the University of Arizona (UA) have partnered to offer an innovative dual degree programme in Systems Engineering minor Engineering Management or minor Industrial Engineering. This programme is designed to provide students with the science and fundamentals of mathematics necessary to analyze and design complex engineering systems.

Students in system engineering bachelor's degree programs use engineering principles to assess a given industry and create models that improve functionality. Students engage in research that allows them to develop innovative methods of tackling problems and improving operations. Systems may include computer networking, product assembly, and transportation. System improvement can benefit virtually any industry, therefore graduates can work in a wide range of fields, including bio-medicine, telecommunications, transportation, information technology, manufacturing and public sector. Careers in systems engineering might involve research, training, testing and system cost planning.

Upon completion, students will graduate with a dual degree from both the University of Mauritius and the University of Arizona.

## **2.0 Objectives**

Upon completion of this programme students should be able to:

- Integrate mathematics, physics, engineering science, operations research, applied probability and statistics, and computer simulation to model and analyze entire systems that are composed of their individual components and subsystems.
- Develop and exercise their capabilities for life- long learning as a means to enhance their technical and social skills.
- Develop and refine their management, communications, and professional skills to increase their effectiveness as team members and team leaders.

## **3.0 General Entry Requirements**

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

## **4.0 Programme Requirements**

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

International students will have to satisfy the UA admission merit criteria. Please refer to the following link: <https://admissions.arizona.edu/>

## **5.0 Minimum Requirements for Degree Award**

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

- Successful completion of 130 Credits as per the programme structure;
- Satisfactory completion of industrial placement 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) would 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

	<b>Normal</b>	<b>Maximum</b>
Degree:	4 years	7 years

## 7.0 Classification of Awards

- (i) Classification of Award by the University of Arizona will be based on the grade point system

The honor, based upon graduation grade-point-average, becomes part of the official record, is awarded upon graduation and appears on the transcript and diploma of the recipient.

1. Summa Cum Laude -- is awarded to candidates whose grade-point-average is 3.900 or higher.
2. Magna Cum Laude -- is awarded to candidates whose grade-point-average is 3.700-3.899.
3. Cum Laude -- is awarded to candidates whose grade-point-average is 3.5000-3.699.
4. Graduate -- is awarded to candidates whose grade-point-average is 2.000-3.499.

The grading system in place at Arizona University is as follows.

GRADING SCALE		DISTRIBUTION	
A	90 to 100%	900 – 1000 Points	A
B	80 to 89%	800 – 899 Points	B
C	70 to 79%	700 – 799 Points	C
D	60 to 69%	600 – 699 Points	D
E	Below 60%	0 – 599 Points	E

Grade	Point
A	4
B	3
C	2
D	1
E	0

(ii) Classification of Award by the University of Mauritius will be based on the CPA obtained. The award classification will be based on the CPA (x) at the end of the Programme of Studies as follows:

CPA	CLASSIFICATION	
$\geq 70$	1 <sup>st</sup> Class	} with Honours
$60 \leq x < 70$	2 <sup>nd</sup> Class 1 <sup>st</sup> Division	
$50 \leq x < 60$	2 <sup>nd</sup> Class 2 <sup>nd</sup> 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

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.

## **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**

- 3 and 4 credit modules shall have 3-hour examination papers.
- Modules with less than 3 credits 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 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> 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  $\geq 50$ .

### **OR Academic Progress as per University of Arizona policy**

Undergraduate students will be considered to be making normal progress toward a degree if their cumulative grade-point-average (GPA) for all work attempted at the University of Arizona is not less than 2.000.

One of the requirements for undergraduates to be eligible to continue at the University is that they earn a minimum cumulative grade-point-average (GPA) of 2.000.

Undergraduate students not meeting academic progress will be placed on academic probation. Academic probation status occurs following any semester when the student's cumulative grade-point-average (GPA) drops below 2.000. The first time that students are placed on academic probation, they should meet with their academic advisor (<http://advising.arizona.edu/>) to discuss the consequences, such as enrollment in a mandatory Academic Recovery Program during the following semester 1 or 2. Students on academic probation are subject to restrictions or requirements, such as certain courses/module that are determined by the faculty in which the student is enrolled. Students are removed from academic probation upon earning the minimum 2.000 cumulative GPA as required by the University. **However, if student's GPA drops below 2.00 after coming out of probation, the student may be terminated from the programme of study. Students may refer to following link for further information:** <https://catalog.arizona.edu/policy/undergraduate-academic-eligibility-policy>.

#### 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 Programme Structure

UOM Codes	UA Codes	Modules	UOM/UA Credit	Prerequisites
		<b>First Year</b>		
		<b>1st Semester</b>		
ENGG 1102(1)	MATH 125	Calculus I with Applications	3	
ENGG 1100(1)	CHEM 151	General Chemistry I	4	
ENGG 1101(1)	ENGL 101	First-Year Composition	3	
MECH 1110(1)	ENGR 102	Introduction to Engineering	3	
MECH 1112(1)	GEOG 150B1	Tier I General Education:– Your Place in the World: Geography and Global Issues	3	
			16	
		<b>2nd Semester</b>		
ENGG 1200(1)	MATH 129	Calculus II	3	
MECH 1207(1)	CHEM 152	General Chemistry II	4	
MECH 1208(1)	ECE 175	Computer Programming for Engineering Applications	3	
MECH 1209(1)	ENGL 102	First-Year Composition	3	
ENGG 1201(1)	PHYS 141	Introductory Mechanics	3	
			16	

UOM Codes	UA Codes	Modules	UOM/UA Credit	Prerequisites
		<b>Second Year</b>		
		<b>3rd Semester</b>		
MECH 2111(3)	SIE 250	Introduction to Systems and Industrial Engineering	4	ENGG1200(1), MECH1209(1)
ENGG 2100(3)	MATH 223	Vector Calculus	4	ENGG1200(1)
ENGG 2102(3)	PHYS 241	Introductory Electricity and Magnetism	4	
MECH 2114(3)	SIE 277	Object-Oriented Modeling and Design	3	MECH1208(1)
MECH 2115(3)	GEOG 150C1	Tier I General Education: Environment and Society	3	
			18	

<b>4th Semester</b>				
MECH 2213(3)	SIE 265	Engineering Management I	3	ENGG1200(1), MECH1209(1)
MECH 2214(3)	SIE 270	Mathematical Foundations of Systems and Industrial Engineering	3	ENGG1200(1)
MECH 2215(3)	SIE 295S	Systems and Industrial Engineering Sophomore Colloquium	1	
ENGG 2200(3)	MATH 254	Intro to Ordinary Differential Equations	3	ENGG1200(1)
MECH 2217(3)	AME 230	Thermodynamics	3	ENGG2102(3)
MECH 2218(3)	ASTR 170A1	Tier I General Education: Planet Earth: Evolution of the Habitable World	3	
			16	

<b>UOM Codes</b>	<b>UA Codes</b>	<b>Modules</b>	<b>UOM/UA Credit</b>	<b>Prerequisites</b>
<b>Third Year</b>				
<b>5th Semester</b>				
MECH 3116(5)	SIE 305	Introduction to Engineering Probability and Statistics	3	ENGG1200(1), MECH1209(1)
MECH 3117(5)	SIE 340	Deterministic Operations Research	3	
MECH 3118(5)	SIE 457	Project Management*	3	
MECH 3119(5)	SIE 462	Production Systems Analysis*	3	
MECH 3120(5)	SIE 367	Engineering Management II*	3	MECH2213(3)
MECH 3121(5)	SIE377	Software for Engineers**	3	MECH1208(1)
MECH 3122(5)	SIE383	Integrated Manufacturing Systems**	3	
MECH 3123(5)	SIE 411	Human Machine Interaction**	3	
		* minor Engineering Management		
		** minor Industrial Engineering	15	
<b>6th Semester</b>				
MECH 3212(5)	SIE 321	Probabilistic Models in Operations Research	3	
MECH 3213(5)	SIE 330R	Engineering Experiment Design	3	
MECH 3214(5)	SIE 370	Embedded Computer Systems	4	
MECH 3215(5)	SIE 406	Engineering Minor Course: Quality Engineering*	3	
MECH 3216(5)	SIE483	Engineering Minor Course: Computer-Integrated Manufacturing Systems**	3	
MECH 3217(5)	MSE 170A2	Tier I General Education: Energy Systems and Sustainability	3	
MECH3201		Industrial Placement	-	
		* <b>minor Engineering Management</b>		
		** <b>minor Industrial Engineering</b>	16	

UOM Codes	UA Codes	Modules	UOM/UA Credit	Prerequisites
		<b>Fourth Year</b>		
		<b>7th Semester</b>		
MECH 4108(5)	ENGR 498A	Cross-disciplinary Design Senior Status	3	
MECH 4109(5)	SIE 410A	Human Factors & Ergonomics in Design	3	MECH3116(5)
MECH 4110(5)	SIE 431	Simulation Modeling and Analysis	3	MECH3116(5)
MECH 4111(5)	SIE 454A	The Systems Engineering Process	3	
MECH 4112(5)	ENGL 308	Technical Writing	3	
			15	
		<b>8th Semester</b>		
MECH 4210(5)	ENGR 498B	Cross-disciplinary Design Senior Status	3	
MECH 4211(5)	SIE 408	Reliability Engineering***	3	MECH3116(5)
MECH 4212(5)	SIE 465	Supply Chain Management***	3	MECH3116(5), MECH3117(5)
MECH 4213(5)	HIST 247	Tier II General Education: Nature and Technology in the World	3	
MECH 4214(5)	GEOS 210	Tier II General Education: Environmental Geology	3	
MECH 4215(5)	SIE 414	Law for Engineers and Scientists	3	
		<b>*** common to both minors Engineering Management and Industrial Engineering</b>	18	
			130	

Note: Systems Engineering requires an engineering minor. Student can choose a minor from the following minors:

- **Engineering Management**
- **Industrial Engineering**

***List of Modules for the Industrial Engineering minor:***

MECH 3121(5) Software for Engineers

MECH 3122(5) Integrated Manufacturing Systems

MECH 4211(5) Reliability Engineering

MECH 3123(5) Human Machine Interaction

MECH 4212(5) Supply Chain Management

MECH 3216(5) Computer-Integrated Manufacturing (CIM) Systems

***List of Modules for the Engineering Management minor:***

MECH 3118(5) Project Management

MECH 3120(5) Engineering Management II

MECH 3215(5) Quality Engineering



MECH 4211(5) Reliability Engineering

MECH 3119(5) Production Systems Analysis

MECH 4212(5) Supply Chain Management