TECHNOLOGY EDUCATION

FOR GRADES 10-11

TEACHING AND LEARNING SYLLABUS

Mauritius Institute of Education
under the aegis of
Ministry of Education, Tertiary Education, Science and Technology

TEACHING AND LEARNING SYLLABUS

Technology Education
for Grades 10-11

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FOREWORD

Technology now permeates the world of today, and future citizens require the necessary knowledge, skills, and dispositions to be able to integrate in such a world. The world in which our future citizens will be living will require revisiting our understanding of employment, with a workforce that is adaptable and innovative. It is becoming increasingly apparent that there cannot be a one-box-fits-all solution when it comes to Education, and it is imperative that our education system adapts to prepare learners for the challenges and opportunities of this dynamic era.

With this vision in mind, we are pleased to present the 'Technology Education for Grades 10-11 (TE)' Curriculum Framework, which has been designed to empower learners with the knowledge, skills, and mindset necessary to thrive in a world where technological advancements are reshaping industries, economies, and societies. It is a curriculum that promotes the acquisition of technical knowledge and skills while fostering a spirit of curiosity, critical thinking, and creativity, where students learn to adapt and innovate to meet the complexities of the digital age with integrity and learn to contribute meaningfully to the world they live in.

Through the palette of subjects and clusters offered, this curriculum seeks to address the diverse needs, interest, and aspirations of individual learners and prepare them for further studies or an eventual entry into the workplace. It encourages learners to explore the connections between technology and other fields of study, promoting a well-rounded understanding of the broader implications of their chosen career path. This curriculum document thus represents a commitment to equipping our learners with the tools they need to shape the future.

The development of this curriculum has been a collaborative effort, involving educators, industry experts, policymakers, and the broader community. Their insights, expertise, and passion have enriched the framework, ensuring its relevance and effectiveness.

I wish to thank all those who have been involved in the production of this document and place on record my deep appreciation for the work accomplished.

Dr. Hemant Bessoondyal
Director
Mauritius Institute of Education

INTRODUCTION

In an ever-evolving world driven by technology, the ability to harness the power of innovation, creativity, and logical thinking is not just a choice but a necessity. To equip the future citizens with essential competencies for a seamless integration into a technology-driven global society, the importance of technology education becomes increasingly evident. The 'Technology Education for grades 10-11 (TE)' curriculum has been designed to act as a stepping-stone for the empowerment of students, providing them with the necessary competencies that will not only allow them to navigate the web of technology but also orient themselves more effectively towards key and emerging pillars of the economy.

The TE programme comprises five compulsory core subjects and three distinct clusters, with each cluster consisting of three subjects. The compulsory subjects are English, French, Applied Mathematics, Applied Life Sciences or Applied Physical Sciences, and Essential Skills (ICT, Arts, and Entrepreneurship). Students have the option to select one of the three clusters, namely 'Engineering Technology', 'Health and Hospitality' and 'Computer Technology and Innovation'. Table 1 below shows the 3 subjects within each specialised cluster.

Table 1: Subjects within the Specialised Clusters

Cluster	Subjects
A. Engineering Technology	1. Fundamentals of Engineering
	2. Engineering applications
	3. Engineering and Sustainability
B. Health and Hospitality	1. Health and Wellness
	2. Hospitality and Culinary Skills
	3. Leisure and Recreation
C. Computer Technology and Innovation	1. Computer Systems and Maintenance
	2. Communication Technologies
	3. Fundamentals of Programming

PEDAGOGY

To empower students with the necessary knowledge, skills, and dispositions to engage in the world of work and/or post Grade 11 secondary education or technical training, a pedagogy that offers an engaging, challenging, and collaborative learning environment is desired for TE. This requires a shift from rote learning and teacher-directed learning to a more learner-centred, student-driven environment.

TE adopts a pedagogy that allows students to acquire experiences connected to real-life and real-work situations. Students acquire knowledge more effectively when putting theory into practice. Therefore, this curriculum promotes a project-based pedagogy, which consists of offering opportunities for in-context learning, experiential learning, application of theory, and reflection. A learner-centred approach engages students in addressing scenarios in real-world situations while developing 21st-century skills, like critical thinking and creativity, in the process. Project-based learning is also a collaborative pedagogy, allowing interaction with peers and developing planning and communication abilities when sharing their understanding and knowledge to resolve difficult situations.

Using a project-driven pedagogy provides holistic learning situations to develop understanding and a broad range of competencies across the Technology Education curricula, thereby breaking down subject barriers and promoting interdisciplinary learning across compulsory areas of learning and elective clusters.
The following indicative methods are significant in implementing the desired pedagogy for TE:

- Learning by practising and doing
- Real-world problem solving
- Learning through enquiry
- Simulation and role play
- Gamification
- Working in groups
- Reflection on learning experiences
- Peer and educator feedback
- Activity-based learning
- Reverse engineering

Real-work interaction, as a teaching and learning approach, is a principal condition to acquire situated knowledge of the world of work. Bearing in mind **possible** age restrictions with respect to on-the-job placement in industries, the following strategies are proposed to fill in gaps between theoretical knowledge and practical applications (theory in action):

- Regular educational visits (full-day on-the-job observation)
- Talks and seminars by targeted professionals
- Learning through virtual environments
- Virtual field trips
- Video conferencing with the intervention of professionals (national and international) from the world of work in technology applications

TEACHING AND LEARNING SYLLABUS

This document presents the teaching and learning syllabus of each of the subjects within the TE programme, which has been devised in collaboration with various stakeholders. The syllabi have been developed to empower students with the generic core competencies of TE and to achieve the goals of TE which are to enable them to:

- develop an understanding of the fundamental concepts of technology;
- develop communication and mathematical skills to confidently operate in technology-oriented education and workplace environments;
- apply creative, innovative, and logical approaches to address challenges in various technology areas;
- realise their full potential and achieve excellence in technology areas of particular interest, which are aligned with their learning traits and preferences;
- foster personal values and work ethics to become responsible members and lifelong learners of technology-based studies and work environments;
- develop critical thinking skills and flexible approaches required to solve problems and conduct research to adapt to technological changes and innovation in education, technical training, and future careers;
- become conversant with potential post Grade 11 education, technical training, and employment opportunities;
- develop skills-based knowledge in planning entrepreneurial initiatives in technology-based areas;
- collaborate with community and peers to develop an appreciation of interpersonal skills in current and future workplaces.

Brought together, the different syllabi detailed in this document provide a holistic guide for students to navigate their way through the ever-evolving technological landscape. It is a journey of discovery, growth, and empowerment, providing the knowledge and skills required to excel in an increasingly technology-driven world.

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ENGLISH

Subject: English

Subject outline:

In an increasingly globalised world, characterised by the prominence of English, the ability to communicate effectively in this language is crucial for academic progression, and for a successful transition into the world of work. This subject aims at developing academic and applied English language skills to complement the study of selected technical subjects and prepare students to communicate in academic and professional contexts. Through authentic and integrated task-based approaches, students develop their ability to understand and respond appropriately and confidently to a range of language learning experiences and communicative situations. As students engage with various modes of English communication, they become better equipped to succeed personally, socially, and professionally.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Develop listening and speaking skills relevant to audience, purpose, and form.

2.0 Read to understand and engage with facts, opinions, and ideas.

3.0 Write to express facts, opinions, and ideas, relevant to audience, purpose, and form, with fluency and accuracy.

1.0: Develop listening and speaking skills relevant to audience, purpose and form
What the students will be able to do:
1.1 Listen to a variety of sources and note down relevant information. 1.2 Convey facts, opinions, and ideas, relevant to audience, purpose, and form. 1.3 Engage appropriately in informal and formal conversations.
How the students may apply their knowledge and skills:
a. Producing a written or visual representation of information gathered from an aural text. b. Delivering a presentation around an idea or argument to a selected audience. c. Participating in conversations with peers and teachers. d. Engaging in mock interviews.
Content and Range
• Audio-visual resources: Ted-Ed talk, YouTube videos, podcasts, news reports, guest speakers, blogs, vlogs • Speaking to a selected audience: peers, potential employers, industrial representatives • Features of online and face-to-face aural texts (e.g., Ted-Ed talks and talks by industrial representatives) • Using notetaking to record gathered information from aural texts • Presentation techniques to inform and persuade an audience using formal or informal register • Using Point –Example-Explanation (PEE) to structure ideas and arguments in a coherent manner • Vocabulary and grammatical structures relevant to: ○ purpose (e.g., to inform and persuade) ○ audience ○ context (e.g., an awareness campaign)

The students will have the opportunity to develop the following attitudes and dispositions:

- Monitoring understanding when listening.
- Demonstrating sensitivity to audience and context.
- Developing confidence when communicating, presenting, and responding to questions.

2.0: Read to understand and engage with facts, opinions, and ideas

What the students will be able to do:

2.1 Use a range of reading strategies to read texts with understanding.
2.2 Apply critical reading skills to engage with a range of texts.
2.3 Research and use different forms of information for academic and professional purposes.
2.4 Communicate effectively about contents of texts.

How the students may apply their knowledge and skills:

a. Responding to comprehension questions and tasks to show understanding.
b. Recognising different points of view and perspectives in texts.
c. Selecting relevant information when researching a chosen topic in Engineering, Health and Hospitality, and Computer Technology and Innovation.
d. Using notetaking to record general and specific information on a selected topic.
e. Summarising key ideas from texts to write work-related texts and make presentations.
f. Providing a personal response to texts.

Content and Range

- Read with understanding a range of functional texts, including work-related texts (e.g., letters, reports, rules and regulations, health and safety procedures, manuals, magazines, blogs, newspapers, travel guides, menus, schedule of activities, and recipes)
- Reading skills:
  - Skimming, scanning and intensive reading
  - Previewing, questioning, summarising, and visualising
  - Predictions using prior knowledge
  - Making inferences using information in the text
  - Research and choose relevant printed and digital sources of information (e.g., the P.R.O.V.E.N method)
  - Recognise facts and opinions and identify bias, stereotypes, and assumptions in texts (e.g., bias in the coverage of the COVID-19 pandemic in India versus Europe)
- Common text structures:
  - Cause and effect
  - Advantages and disadvantages
  - Problem and solution
  - Compare and contrast
  - Chronological order
- Notetaking (e.g., one-pager, graphic organisers)

The students will have the opportunity to develop the following attitudes and dispositions:

- Developing sensitivity by engaging with texts from diverse cultural contexts.
- Engaging in independent reading and being receptive to new ideas.
- Monitoring their reading progress.

3.0: Write to express facts, opinions, and ideas, relevant to audience, purpose and form, with fluency and accuracy

What the students will be able to do:

3.1 Write a range of texts effectively for different purposes and audiences.
3.2 Use accurate vocabulary and grammatical structures for clarity.
3.3 Use language in creative and engaging ways to appeal to an audience.
3.4 Acknowledge sources of information.

How the students may apply their knowledge and skills:

a. Plan and produce functional texts using writing conventions:
   i. Reports
   ii. Letters and emails
   iii. Digital content (blog entry, vlog, online review)
b. Plan and produce work-related and creative texts using writing conventions:
   i. A CV and cover letter to respond to a job advert
   ii. A persuasive speech
   iii. Flyers
   iv. An informative poster on a set topic
c. Plan and produce a portfolio using selected guided and extended writing tasks

Content and Range

- Different purposes of writing: e.g., writing to inform, persuade, describe, reflect, and for transactional purposes
- Features of and producing a range of texts: letters, reports, newsletters, blogs, vlogs, schedule of activities, online reviews, curriculum vitae, cover letter, and presentations
- Summary Writing
- The stages of the writing process: prewriting, drafting, revising, editing, and proofreading
- Vocabulary and grammatical structures relevant to:
  - purpose (e.g., to inform and persuade)
  - audience
  - context (e.g., an awareness campaign)
- Stylistic devices to create impact on audience: metaphor, alliteration, simile, rule of three. (e.g., presentations, conversations, awareness campaigns)
- Use of communication technologies to produce and enhance written output
- Using a recommended citation guide to acknowledge sources of information

The students will have the opportunity to develop the following attitudes and dispositions:

- Developing a sense of ownership and satisfaction in own work.
- Adopting ethical behaviour in producing own work and acknowledging others' work.
- Presenting an informed opinion, stance or position with conviction and confidence.
- Engaging with diverse points of view and perspectives respectfully.
- Developing personal voice, creativity, and originality in the choice of language and expression.
- Collaborating and sharing feedback to enhance own and others' work.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

FRENCH

Subject: French

Subject outline:

Dans le village global qu'est le monde, la maîtrise et l'utilisation des langues majoritaires sont un avantage capital. A Maurice, le français se positionne comme une des langues les plus utilisées, et sa maîtrise est un gage de succès, tant académique, professionnel que personnel et la capacité de communiquer dans cette langue est, à cet égard, un atout considérable dans le monde du travail et à l'école. Ce syllabus vise à développer les compétences linguistiques et communicatives chez nos apprenants en les outillant à comprendre, agir et réagir convenablement en français dans des situations qui les engagent dans un contexte linguistique et communicatif. Nos apprenants seront appelés à développer les quatre grandes compétences essentielles à leurs besoins et à les réinvestir en les appliquant dans leur contexte académique et professionnel.

Guided learning hours: 5 periods per week

Core subject competencies:

1.0 Décoder et comprendre un discours (oral et écrit) en français.

2.0 Démontrer la capacité de prendre la parole dans des contextes professionnels et académiques.

3.0 S'exprimer à l'écrit avec correction et clarté de façon formelle et informelle dans des situations professionnelles et académiques.

4.0 Démontrer la capacité d'effectuer des recherches et s'en approprier le contenu pour leurs besoins académiques et professionnels.

1.0: Décoder et comprendre un discours (oral et écrit) en français
What the students will be able to do:
1.1 Démontrer leur compréhension des points essentiels d'un discours quand il s'agit de sujets familiers ou relatifs à leurs intérêts. 1.2 Retenir l'essentiel des informations sur des sujets factuels et/ou professionnels. 1.3 Identifier des informations pertinentes dans un contexte multilingue. 1.4 Pouvoir interpréter des données à partir d'un texte oral et graphique. 1.5 Pouvoir lire et comprendre des écrits sur une gamme de sujets familiers ou relatifs à leurs intérêts. 1.6 Pouvoir comprendre la description d'événements et l'expression d'idées, d'opinions et d'attitudes à partir d'un texte papier ou numérique. 1.7 Pouvoir identifier et sélectionner des informations spécifiques à partir d'un texte papier ou numérique.

How the students may apply their knowledge and skills:

The student will apply the knowledge and skills through:

- Restituant à l'oral et à l'écrit les points saillants d'un discours écouté/entendu et lu.
- Pouvant se rappeler et retenir des informations spécifiques données dans un discours écouté/entendu (en KRM ou en anglais) et lu en français.
- Utilisant les stratégies de décodage par rapport à l'écoute et la compréhension orale.
- Utilisant les stratégies de décodage par rapport à la lecture et la compréhension écrite.

Content and Range

- Stratégies de décodage/compréhension de sujets familiers, d'expressions et mots techniques relatifs aux professionnels
- Les lacunes à la compréhension et les solutions
- Les buts d'un discours oral et de sa compréhension
- Liste d'observation pour les stratégies à adopter pour le décodage/la compréhension
- Les différents types de textes oraux
- Exercices pratiques

The students will have the opportunity to develop the following attitudes and dispositions:

- Faire preuve d'autonomie.
- Savoir organiser son travail selon les objectifs énoncés.
- Démontrer la capacité d'utiliser un ton, un style et une terminologie adaptés à la personne et aux circonstances.
- Travailler avec les autres de manière solidaire en contribuant au travail de l'équipe
- Faire preuve de bienveillance et respecter la dignité des pairs dans le travail collaboratif.

2.0: Démontrer la capacité de prendre la parole dans des contextes professionnels et académiques

What the students will be able to do:

2.1 S'exprimer en adaptant son langage à la situation de communication professionnelle et/ou académique et en utilisant un vocabulaire y relatif.
2.2 S'exprimer sur une gamme de sujets professionnels et/ou académiques et présenter, discuter, négocier, argumenter et donner des opinions.

How the students may apply their knowledge and skills:

The student will apply the knowledge and skills through:

- Utilisant un français académique/technique pour prendre la parole dans des contextes académiques et professionnels en présentant, en discutant, en négociant, en argumentant et en donnant des opinions pour structurer ses idées.
- Démontrant la capacité d'adapter son vocabulaire au contexte.
- Utilisant le registre qui convient au contexte.

Content and Range

- Techniques de présentation, de structuration des idées
- Spécificités des présentations
- Prosodie
- Participation active
- Contextualisation
- Exercices pratiques

The students will have the opportunity to develop the following attitudes and dispositions:

- Démontrer une capacité d'adaptation et d'aisance dans la prise de parole.
- Adopter une posture appropriée et une certaine spontanéité pour la prise de parole en public.
- Démontrer la capacité de décision d'utilisation du registre approprié.
- Arriver à capter l'attention de son audience.
- Faire preuve d'autonomie en se prenant en charge selon ses responsabilités.

3.0: S'exprimer à l'écrit avec correction et clarté de façon formelle et informelle dans des situations professionnelles et académiques.

What the students will be able to do:

3.1 Démontrer la capacité de rédiger un courriel, une lettre de motivation et un curriculum vitae entre autres, selon les contextes.

3.2 Utiliser le registre formel/informel dans les contextes appropriés.

3.3 Utiliser les éléments grammaticaux, la ponctuation, la structure appropriés pour l'expression écrite.

3.4 Parvenir à intégrer des éléments de créativité dans leurs écrits.

3.5 Produire des rapports, des résumés, des devis, des appels d'offres, des textes informatifs et argumentatifs en utilisant un langage académique/professionnel.

3.6 Démontrer une capacité de rédaction de différents textes formels et/ou informels.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Rédigeant des courriels, des lettres et un cv (par ex.) qui respectent les normes requises (syntaxe et sémantique) en temps réel.
- Développant et exprimant ses idées et ses points de vue de façon claire, concise et correcte.
- Utilisant le type de texte approprié selon le contexte.
- Respectant les normes graphiques, structurels et syntaxiques pour la rédaction des différents textes.
- Rédigeant des textes en respectant cohésion, clarté et correction
- Produisant des textes reflétant une certaine créativité.

Content and Range

- Les stages et processus dans la rédaction/écriture
- Les objectifs de ce processus
- Révision de son texte
- Actions sur les rétroactions
- Réflexivité sur les textes produits
- Différents types, styles et genres de texte/d'écriture
- Exercices pratiques

The students will have the opportunity to develop the following attitudes and dispositions:

- Démontrer de la créativité dans son expression.
- Démontrer son efficacité en atteignant les objectifs énoncés.
- Démontrer un esprit d'initiative pour accomplir les tâches proposées.
- Faire preuve d'intelligence émotionnelle.
- Démontrer l'aptitude de recevoir des commentaires/remarques en rétroaction.

4.0: Démontrer la capacité d'effectuer des recherches et s'en approprier le contenu pour leurs besoins académiques et professionnels

What the students will be able to do:

4.1 Chercher et identifier une variété de sources et de genres d'informations pertinentes à leurs besoins.
4.2 Être capable de s'approprier du contenu de différents types de textes et comprendre les points de vue mis en exergue.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Utilisant les stratégies de recherche pour sélectionner les informations requises
- Démontrant la capacité d'utiliser les mots-clés corrects pour effectuer ses recherches.
- Démontrant la capacité de prendre note de différents types de textes dans le contexte professionnel et académique et d'identifier les points de vue mis en exergue.

Content and Range

- Types et caractéristiques des sources d'information
- Techniques de recherche efficaces
- Organisation des informations recueillies et prise de notes
- Évaluation de la pertinence des sources et sélection
- Lecture et analyse critiques des informations
- Synthèse, résumé
- Utilisation éthique des informations
- Exercices pratiques

The students will have the opportunity to develop the following attitudes and dispositions:

- Utiliser son jugement pour faire le bon choix.
- Réaliser son travail en étant fidèle à des valeurs et en étant intègre.
- Démontrer une compétence informationnelle (repérer, identifier et organiser les informations).
- Démontrer un esprit d'initiative et de concentration sur la tâche.

Mode of Assessment

50%	50%
1 portfolio continuously built and assessed throughout the programme	Written Examination

APPLIED MATHEMATICS

Subject: Applied Mathematics

Subject outline:

Mathematics is the study of numbers, space, measures, patterns, and relationships which enables individuals to analyse information and make informed decisions. A strong mathematical background is needed to model and solve real life problems, related to numbers, geometry, measurement, algebra, probability and statistics. This course provides students with the foundational mathematical competencies needed in the world of work.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Use numerical concepts in real life

2.0 Use algebra to formulate and solve problems

3.0 Draw and interpret linear and quadratic graphs in practical situations

4.0 Use concepts of measurements in problem solving

5.0 Use geometric concepts in real life contexts

6.0 Use probability and statistical concepts to solve problems in context

1.0: Use numerical concepts in real life
What the students will be able to do:
1.1 Use numbers and estimates in different fields. 1.2 Use the concept of percentage in real life contexts. 1.3 Convert and use rate in authentic situations. 1.4 Compare real-life quantities using ratio and proportion.
How the students may apply their knowledge and skills:
The students will apply the knowledge and skills through: - Class activities - Using numbers in different contexts - Modelling real-life situations - Interpreting numerical quantities in different contexts - Solving applied problems
Content and Range
• Types of numbers, estimations, and standard and binary forms • Percentage • Laws of indices • Rate, ratio, and proportion • Applications of numbers in real life

The students will have the opportunity to develop the following attitudes and dispositions:

- Showing confidence in working with numbers.
- Being resourceful to apply concepts of percentage in real-world contexts.
- Showing curiosity and interest to learn concepts related to numbers.

2.0: Use Algebra to formulate and solve problems

What the students will be able to do:

2.1 Manipulate algebraic expressions and fractions.
2.2 Solve algebraic equations.
2.3 Solve linear simultaneous equations in two unknowns.
2.4 Factorise quadratic expressions and solve quadratic equations (including use of quadratic formula).
2.5 Solve systems of linear inequalities.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Modelling and solving real life problems (e.g. finding unknown quantities in problems involving area or perimeter)
- Using inequalities to model real-life problems.

Content and Range

- Algebraic expressions: operations, manipulation, and factorisation
- Linear and quadratic equations
- System of linear inequalities

The students will have the opportunity to develop the following attitudes and dispositions:

- Developing confidence in modelling and solving problems.
- Showing logical reasoning.
- Exploring alternative methods in solving problems

3.0 Draw and interpret linear and quadratic graphs in practical situations

What the students will be able to do:

3.1 Draw and interpret linear and quadratic graphs.
3.2 Solve problems involving graphs in context.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Drawing graphs from given data.
- Interpreting graphs in practical situations (e.g. in Applied life/physical sciences).

Content and Range

- Graphs of lines and Quadratic curves
- Point of intersection of 2 graphs
- Interpret graphs in context

The students will have the opportunity to develop the following attitudes and dispositions:

- Showing confidence in working with graphs.
- Appreciating the use of graphs in authentic situations.

4.0: Use concepts of measurements in problem solving

What the students will be able to do:

4.1 Solve problems involving measures.
4.2 Use and interpret concepts of measurement in real life

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Modelling real-life situations
- Using and interpreting measurement quantities in contexts
- Solving real-life problems involving measurement

Content and Range

- Length and mass: metric units, conversions, and applications
- Time: units, time zone, conversion, and applications
- Money: conversions of currency
- Area and perimeter: 2D and compound shapes, circles, and sectors
- Surface area of 3D shapes
- Volume and capacity
- Density

The students will have the opportunity to develop the following attitudes and dispositions:

- Motivated to learn and apply the concept of measures in real life situations.
- Showing confidence and persistence in solving problems related to measures.

5.0: Use geometric concepts in real life context

What the students will be able to do:

5.1 Find unknown angles of polygons.
5.2 Draw and describe the symmetry of 2D shapes.
5.3 Identify and work with similar shapes.
5.4 Construct triangles and quadrilaterals, angle, and perpendicular bisectors
5.5 Find gradient and equation of straight lines (including parallel and perpendicular lines)
5.6 Use Pythagoras theorem.
5.7 Use trigonometric ratios to find unknown angles and/or sides in right- angled triangles.
5.8 Use sine rule and cosine rule in context.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Calculating unknown angles in polygons related to context.
- Creating geometrical patterns, models and designs.
- Identifying parts of a diagram related to real life contexts (e.g., engineering, arts, and design)
- Solving problems in context.
- Using trigonometry in designing, architecture, and engineering.

Content and Range

- Polygons and angles
- Length and area in similar shapes
- Triangles and quadrilaterals
- Gradient and equation of lines (including parallel and perpendicular lines)
- Trigonometric ratios and applications
- Area of triangles
- Sine rule and cosine rule

The students will have the opportunity to develop the following attitudes and dispositions:

- Appreciate the importance and application of geometrical concepts in real life.
- Showing persistence in solving problems related to geometry.

6.0: Use probability and statistical concepts to solve problems in context

What the students will be able to do:

6.1 Find probability of single and combined events.
6.2 Represent and interpret quantitative data.
6.3 Calculate measures of central tendency and spread of a set of data.
6.4 Calculate estimate of mean and quartiles for grouped data.
6.5 Plot scatter diagram, and draw and use line of best fit in decision making.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Solving problems related to real contexts (e.g., weather forecasts, medical diagnosis, traffic signals, insurance plans, game outcomes, sports, etc.).
- Drawing and interpreting graphs and charts in Economics, Business, Health and Hospitality and Engineering.

Content and Range

- Basic laws of Probability
- Tree and possibility diagrams
- Charts and diagrams
- Mean, median, mode, and range and interquartile range (including grouped data)
- Scatter diagram and line of best fit

The students will have the opportunity to develop the following attitudes and dispositions:

- Showing confidence in working with probability and statistics.
- Being resourceful to apply concepts of statistics in the real-world contexts.
- Showing curiosity and interest to learn concepts related to probability and statistics.
- Use statistical representations to communicate ideas.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

APPLIED LIFE SCIENCES

Subject: Applied Life Sciences

Subject outline:

Applied Life Sciences aims at developing in learners the essential scientific proficiencies needed to produce a scientific citizenry, support the growing economy and face complex, local and global challenges such as climate change, energy crisis, food security, water crisis, and emergence of new epidemics. The subject adopts a competency, skill-based, problem-solving approach, where scientific concepts, processes and principles are applied to solve authentic real-life problems. Applied Life Sciences also prepares learners to pursue studies at higher academic levels and familiarises them to the world of work.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Apply the scientific method in the study of cell dynamics.
2.0 Apply the scientific method in the study of matter and its interactions.
3.0 Investigate the world of work focussing on sustainable agricultural practices.
4.0 Investigate the world of work focussing on blue economy.
5.0 Explore the use of biotechnology.
6.0 Identify and address environmental issues within their own contexts.
7.0 Recognise health-related issues and apply appropriate contextualised solutions.

1.0: Apply the scientific method in the study of cell dynamics.
What the students will be able to do:
1.1 Define cell, tissue, organ and organ system. 1.2 Identify, label and draw a typical animal cell, plant cell, bacterium and virus as seen in diagrams and photomicrographs. 1.3 Identify and state the functions of structures typically found in animal cells, plant cells, bacteria and viruses. 1.4 Use the scientific method to investigate the microscopic world. 1.5 Describe the movement of substances across membranes limited to diffusion and osmosis. 1.6 Describe applications of diffusion and osmosis in everyday situations. 1.7 Describe the factors affecting the rate of diffusion. 1.8 Define an enzyme. 1.9 Describe the mode of action of enzymes. 1.10 Explain the effects of changes in temperature and pH on the rate of enzymatic reaction. 1.11 Explain how enzymes are used in industries.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Preparing slides of animal and plant tissues using the temporary staining technique.
- Examining the prepared slides under a light microscope.
- Drawing cells observed under the microscope and calculating magnifications of drawings.
- Investigating 'What is in a drop of pond water' (groupwork).
- Investigating how diffusion and osmosis are used in food preservation, brewing tea, and food colouring.
- Investigating the factors affecting the rate of diffusion.
- Investigating the effect of changes in temperature and pH on the rate of enzymatic reactions.
- Developing factsheets to illustrate the use of enzymes in real life applications with reference to biological washing powders, pectinase in fruit juice production, and lactase in lactose-free milk.
- Designing a poster to show the role of enzymes in existing entrepreneurial start-up initiatives in Republic of Mauritius.
- Ideating start-up opportunities based on the use of enzymes.

Content and Range

- Cell, tissues, organs and organ systems
- Cell structures and functions found in typical animal cells, plant cells, bacteria and viruses: Cell membrane, cytoplasm, nucleus, genetic materials (DNA or RNA), mitochondria, chloroplasts, sap vacuole, cell wall, plasmids, capsid and viral envelope
- Microscopy and magnifications
- Exploring 'What is in a drop of pond water': Formulate hypothesis, prepare slides, examine slides, record observations and conclude
- Diffusion and osmosis
- Factors affecting rate of diffusion: concentration/gradient, surface area and temperature
- Enzymes: biological catalyst that speed up the rate of chemical reaction by lowering the activation energy, without being changed by the reaction
- Mode of action of enzymes: Lock and key hypothesis
- Factors affecting rate of enzymatic reaction: Temperature and pH

The students will have the opportunity to develop the following attitudes and dispositions:

- Cultivating inquisitiveness about the microscopic world.
- Applying scientific process skills such as observing, analysing, recording, and communicating findings.
- Cultivating innovative mindset, entrepreneurial skills, critical thinking, risk-taking, confidence and problem solving.

2.0: Apply the scientific method in the study of matter and its interactions.

What the students will be able to do:

2.1 Demonstrate understanding of the terms: atom, element, compounds, molecules and mixtures.
2.2 Describe the classification of elements in the Periodic Table.
2.3 Describe the structure of an atom in terms of sub-atomic particles.
2.4 Determine the electronic configuration of elements and their ions with respect to their positions in the Periodic Table.
2.5 State the elements that make up biological molecules.
2.6 Describe different types of chemical bonding.
2.7 Explain the properties of materials in relation to bonding and structure.
2.8 Determine the identity of molecules found in food.
2.9 Understand that reactions can be endothermic or exothermic, referring to enthalpy change of reaction.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Building models to represent atomic structure.
- Drawing of dots and cross diagrams to represent chemical bonding.
- Conducting experiments to determine the differences between ionic compounds and simple molecular compounds.
- Investigating the accuracy of nutritional labelling using food tests.
- Performing simple DNA extraction from suitable plant materials.
- Elucidating criminal cases by analysing forensic results.
- Investigating energy changes occurring during chemical reactions.

Content and Range

- Sub-atomic particles: Protons, neutrons and electrons for elements of atomic number 1-20
- Type of particles: Atoms, isotopes, compounds, molecules, and ions
- Biological molecules: Carbohydrate (glucose, sucrose and starch), lipids, proteins and nucleic acids (DNA)
- Bonding: Metallic, ionic and covalent
- Structure: Giant metallic lattice, giant ionic lattice, simple molecular lattice, giant molecular lattice (diamond and graphite)
- Food tests: Reducing sugar, non-reducing sugar, starch, biuret, and lipids emulsion tests.
- DNA extraction
- Energy changes in chemical reactions in relation to combustion, respiration, and photosynthesis

The students will have the opportunity to develop the following attitudes and dispositions:

- Demonstrating ethical and responsible conduct in using laboratory materials and equipment.
- Working collaboratively in groups to solve problems.
- Developing creativity through formation of models using scrap materials and 3D printing technology.

3.0: Investigate the world of work focusing on sustainable agricultural practices.

What the students will be able to do:

3.1 Explain the process of photosynthesis.

3.2 Outline the effect of varying light intensity, carbon dioxide concentration and temperature on the rate of photosynthesis and crop production.

3.3 Outline the process of crop production.

3.4 Outline the stages of poultry production as an example of livestock production.

3.5 Describe sustainable agriculture.

3.6 Outline sustainable agricultural practices.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Preparing and presenting reports (groupwork) on field visits in local industries involved in crop and livestock production.
- Engaging in school-based projects on vertical gardening, hydroponics, aeroponics, and poultry.

Content and Range

- Photosynthesis: Process of producing glucose and oxygen using carbon dioxide and water in the presence of light and chlorophyll
- Balanced equation representing the process of photosynthesis
- Process of crop production: Ploughing, sowing, adding manure and fertilisers, irrigation, harvesting and storage
- Stages of poultry production: Incubation, hatching, and brooding
- Sustainable agricultural practices: Organic farming methods, crop rotation, composting, cover cropping and water management (rainwater harvesting and water-efficient crop selection)

The students will have the opportunity to develop the following attitudes and dispositions:

- Demonstrating entrepreneurial skills and principles in designing and developing school-based projects.
- Gaining practical insights and experiences related to industries.
- Appreciating the importance of sustainable agriculture and green agriculture as viable solutions for food shortages and auto-sufficiency in Mauritius.

4.0: Investigate the world of work focusing on blue economy.

What the students will be able to do:

4.1 Identify key physical, chemical and biological characteristics of the sea.

4.2 Explain what is meant by the term exclusive economic zone (EEZ).

4.3 Define the blue economy.

4.4 Outline the process of aquaculture.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Investigating specific physical and chemical characteristics of the sea.
- Investigating the biological characteristics of the seas forming part of the Republic of Mauritius, through field visits.
- Designing and implementing school-based projects on aquaculture.
- Preparing and presenting (groupwork) field-trip reports on visits to local blue economy industries.

Content and Range

- Physical characteristics of the sea: density, light penetration, temperature and tides.
- Chemical characteristics of the sea: pH and salinity
- Biological characteristics of the sea: fish, marine plants (seaweeds and seagrasses), invertebrates (octopuses, crabs, shrimps, and corals), marine mammals, reptiles and birds
- Exclusive economic zone
- Blue economy industries: Fishing, seafood processing, marine biotechnology and aquaculture.

The students will have the opportunity to develop the following attitudes and dispositions:

- Developing experiences that go beyond classroom learning and providing real-world insights into how industries operate.
- Fostering design thinking skills.

5.0: Explore the use of biotechnology.

What the students will be able to do:

5.1 Explain how bacteria and yeast are used in biotechnology.

5.2 Explain the use of fermenters for large-scale production of ethanol.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Using yeast to produce bread and ethanol.
- Using bacteria to produce yoghurt, considering all safety protocols.
- Investigating the use of microorganisms and enzymes in cheese production.
- Preparing field-trip reports following visits to local industries involved in biotechnology.

Content and Range

- Biotechnology
- Bread production
- Ethanol formation
- Yoghurt production
- Cheese production

The students will have the opportunity to develop the following attitudes and dispositions:

- Developing experiences that go beyond classroom learning and providing real-world insights into how industries operate.
- Respecting counter positions.
- Developing effective communication, critical thinking and manipulative skills.

6.0: Identify and address environmental issues within their own contexts.

What the students will be able to do:

6.1 Define ecology, population, community and ecosystem, and biodiversity.
6.2 Differentiate between renewable and non-renewable sources of energy.
6.3 State that petrol is the source of alkanes.
6.4 Analyse the impacts of human beings on the ecosystem.
6.5 Explain key conservation and preservation measures referring to the Republic of Mauritius.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Naming and drawing the structural and displayed formulae of alkanes (C1 to C4).
- Using whole-school approach to identify, analyse (drawing from the ecological, social, economic and political aspects), ideate, design and implement an action plan to address an environmental issue.
- Preparing reports following visits to local enterprises involved in manufacturing green products or providing green services.
- Ideating start-up based on green products and services.

Content and Range

- Biodiversity: the variety of species and their respective numbers found in a defined area
- Effects of man on ecosystem: Deforestation, pollution (air, water and land) and overconsumption
- Environmental impacts of using petrol as an energy source
- Environmental issues: global warming, climate change and biodiversity loss
- Conservation and preservation measures: Captive breeding, zoning, conservation management areas, quotas, renewable energy transition, educational programme and sensitisation campaigns

The students will have the opportunity to develop the following attitudes and dispositions:

- Cultivating the sense of environmental responsibility and demonstrating ethical behaviour towards the natural world.
- Developing effective communication skills to articulate environmental challenges, engage stakeholders, and advocate for sustainable solutions.
- Demonstrating problem solving and entrepreneurial skills.

7.0: Recognise health-related issues and apply appropriate contextualised solutions

What the students will be able to do:

7.1 Differentiate between communicable and non-communicable diseases.
7.2 Describe a pathogen as a disease-causing organism.
7.3 Outline transmission of pathogens by direct and indirect means.
7.4 Demonstrate clear comprehension of how vaccination provides active artificial immunity.
7.5 Use stoichiometry and the mole concept in health-related quantitative analysis.
7.6 Define molecular formula, empirical formula, relative atomic mass, relative molecular mass, relative formula mass.
7.7 Describe the terms solvent, solute, solution and saturated solution.

How the students may apply their knowledge and skills:
The students will apply the knowledge and skills through: - Presenting factsheets prepared in groups on the causes, clinical features, diagnosis, treatment, and prevention of specific communicable and non-communicable diseases. - Analysing and interpreting real data to investigate the temporal progression of the COVID-19 pandemic in Mauritius for effective pandemic management. - Engaging in the sensitization of the school community, through talks in morning assembly and drama, on prevailing health crises (emergence and re-emergence of epidemics, antimicrobial resistance, and vaccination resistance. - Applying stoichiometry and dilution techniques in medical laboratory tests, blood count analysis, and drug preparation processes. - State that Rapid Antigen test and PCR are used in the detection of SARS-CoV-2, responsible for the COVID-19 disease. - Using dipstick for testing blood glucose concentration.
Content and Range
• Communicable and non-communicable diseases • Communicable diseases: AIDS, and COVID-19 • Non-communicable diseases: diabetes mellitus, cancer • Immunity • Health issues and crises: Emergence and re-emergence of epidemics, antimicrobial resistance, and vaccination resistance • Quantitative analysis: Dilution (simple and serial dilution), acid-base titrations, mole concepts • COVID tests
The students will have the opportunity to develop the following attitudes and dispositions:
• Demonstrating the necessary attitudes towards epidemics and pandemics. • Cultivating civic engagement. • Appreciating the importance of ensuring the accuracy and reliability of data obtained from analytical chemistry techniques and technology-driven devices.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

APPLIED PHYSICAL SCIENCES

Subject: Applied Physical Sciences

Subject outline:

Applied Physical Sciences explores the intricacies of physical and chemical phenomena within non-living systems. This inquiry-driven subject is designed to equip students with fundamental competencies centered on five core themes: measurement, systems and models, energy, diversity, and interactions. Beyond theoretical knowledge, Applied Physical Sciences actively promote the practical application of these central themes across various industries, fostering higher-order thinking and reasoning.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Perform accurate measurements as an integral part of scientific inquiry.
2.0 Use models and systems to unpack the relationships between structures and behaviour of non-living systems.
3.0 Examine the characteristics and functions of energy within non-living systems.
4.0 Explore the diversity of non-living systems, considering their unique attributes and properties.
5.0 Analyse the interactions occurring within physical and chemical systems.

1.0: Perform accurate measurements as an integral part of scientific inquiry.
What the students will be able to do:
1.1 Use standard laboratory measurement devices to carry out scientific investigations including separation techniques. 1.2 Apply knowledge of force as direct and indirect measurements in physical systems. 1.3 Use stoichiometry and the mole concept to perform measurements for determining chemical compositions and reactions.
How the students may apply their knowledge and skills:
The student will apply the knowledge and skills through: - Selecting suitable apparatus for a variety of simple experiments having industrial applications. - Conducting simple laboratory experiments, including methods of purification and analysis by adhering to safety procedures. - Investigating the effects of balanced and unbalanced forces on the motion and shape of objects through experiments. - Solving stoichiometric problems for determining chemical compositions and reactions. - Interpreting observational data obtained during field trips, drawing informed conclusions about the operations and processes in the industrial setting.

Content and Range

- Measurement and experiment: length, time, mass, volume, and temperature
- Methods of purification and analysis: filtration, crystallisation, sublimation, distillation, chromatography
- Balanced and unbalanced forces: motion, friction, moment of a force, elastic deformation, Pascal's principle in hydraulic systems
- Stoichiometry and mole concept: formulae and chemical equations, relative atomic mass, relative molecular mass, relative formula mass, mole, Avogadro constant, reacting masses, gas volume, limiting reactants, solution concentration

The students will have the opportunity to develop the following attitudes and dispositions:

- Respecting safety rules, guidelines, and procedures of a science laboratory for conducting experiments.
- Nurturing healthy and safe science laboratory practices.
- Showing integrity and maintaining transparency in reporting experimental findings.

2.0: Use models and systems to unpack the relationships between structures and behaviours of non-living systems.

What the students will be able to do:

2.1 Use the kinetic particle model to describe and explain the properties of matter.

2.2 Describe the structure of atoms, elements, and compounds.

2.3 Recognise the Periodic Table as the organizational framework for chemical elements.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Using computer simulation to investigate the interplay between the microscopic and macroscopic properties of matter.
- Constructing models to represent atoms, electronic configuration of elements, and giant lattice structures.
- Deducing properties and industrial applications of substances from their structures and bonding, and vice versa.
- Using the Periodic Table to predict the properties and industrial applications of elements.

Content and Range

- Properties and behaviour of states of matter, particle structure of the 3 states of matter
- Relationship between the:
  - motion of particles and temperature
  - pressure and temperature at constant volume
  - volume and temperature at constant pressure
  - pressure and volume at constant temperature
- Boyle's law experiment
- Atoms, elements and compounds: atomic structure, structure and properties of materials, ionic bonding, covalent bonding and metallic bonding
- The Periodic Table: Group I, Group VII & Group VIII

The students will have the opportunity to develop the following attitudes and dispositions:

- Showing interest in scientific matters related to structures and behaviours of non-living systems.
- Valuing waste and scrap materials as a resource for constructing different structural models.
- Appreciating the visual representation of elements within the Periodic Table for deducing or predicting the properties of elements and their compounds.

3.0: Examine the characteristics and functions of energy within non-living systems.

What the students will be able to do:

3.1 Analyse chemical reactions in terms of energy changes and collision theory.
3.2 Differentiate among the different modes of thermal energy transfer.
3.3 Discuss the use of petroleum as an influential source of energy.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Describing and explaining overall enthalpy changes of chemical reactions when conducting experiments.
- Investigating the effect of a given variable on the rate of reactions through experiments.
- Investigating the transfer of thermal energy in solids and liquids using hands-on activities.
- Investigating how the nature of surfaces affects infra-red radiation through experiments.
- Discussing issues relating to the competing uses of oil as an energy source.
- Debating ideas regarding solutions for environmental and economic challenges in energy sources, including oil spills.

Content and Range

- Enthalpy change: endothermic and exothermic reactions, bond breaking and bond making
- Rate of reaction: concentration, pressure, particle size, temperature and catalyst
- Transfer of thermal energy by conduction, convection and infrared radiation
- Sources of energy: petroleum and hydrocarbons

The students will have the opportunity to develop the following attitudes and dispositions:

- Developing a sense of responsibility towards both the environmental and economic implications of energy use.
- Recognising that the youth are valuable contributors to climate action through reduced fossil fuel consumption.
- Fostering empathy by listening to the narratives of those directly or indirectly affected by oil spills.

4.0: Explore the diversity of non-living systems, considering their unique attributes and properties.

What the students will be able to do:

4.1 Recognise the diversity of metals.
4.2 Identify the diverse classes of organic compounds.
4.3 Elaborate on concepts related to diverse types of waves.
4.4 Classify electromagnetic waves based on their distinct applications as well as their possible dangers.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Using experimental data to describe the general physical properties of metals in terms of their structure.
- Investigating the relative reactivity of metals by displacement reactions of metals from aqueous solutions of their salts through laboratory-based experiments.
- Debating the economic and environmental aspects of recycling metals.
- Classifying classes of organic compounds through qualitative analysis.
- Using molecular models to interpret a range of unbranched and branched organic compounds.
- Investigating the correlation between the solidity of margarine and its hydrogenated (saturated) fat content.
- Researching and investigating mechanical and electromagnetic waves.
- Performing hands-on laboratory experiments to find the speed of water waves.
- Producing an information leaflet on electromagnetic waves.

Content and Range

- Metals
- Organic compounds: alkanes, alkenes, alcohols, carboxylic acids
- Properties and behaviour of waves
- Applications and dangers of electromagnetic waves

The students will have the opportunity to develop the following attitudes and dispositions:

- Adopting a healthy lifestyle by limiting intake of saturated fats and avoiding trans fats.
- Appreciating the diversity of non-living systems as an endless source of wonder and discovery.

5.0: Analyse the interactions occurring within physical and chemical systems.

What the students will be able to do:

5.1 Analyse electrical circuits.
5.2 Discuss the interactions between electricity and magnetism.
5.3 Describe the operation of a D.C. motor, an A.C. generator and a transformer.
5.4 Investigate the chemical interactions between acids, bases, and salts, and their uses.

How the students may apply their knowledge and skills:
The students will apply the knowledge and skills through: - Applying Ohm's law to solve simple electrical problems with resistors arranged in series and parallel. - Calculating power and energy generated/dissipated in simple electrical circuits. - Calculating the value of a resistor using the resistor color code. - Investigating the properties of magnet through hands-on laboratory experiments - Constructing a simple electromagnet using dry cells, insulated copper wire, and an iron nail. - Describing how electromagnets are used in recycling plants. - Investigating electromagnetic induction and Lenz's law through hands-on laboratory experiments. - Working in groups to construct a simple A.C. generator and D.C. motor. - Describing the difference between AC and DC current. - Discussing the environmental and cost implications of underground power transmission compared to overhead lines. - Researching how electrical energy transmission at high voltage leads to a reduction in energy loss. - Constructing a simple transformer. - Differentiating between a step-up and step-down transformer. - Calculating the current and voltage across the primary and secondary coils in an ideal transformer. - Investigating the properties of acids, bases and salts through laboratory-based experiments. - Conducting acid-base titration to identifying its endpoint. - Preparing and separating soluble salts and insoluble salts that have important industrial applications.
Content and Range
• Ohm's law experiment, simple electrical circuits with resistors in series and parallel, Electrical energy in components, resistors color code. • Magnetism, electromagnetism and magnetic field patterns • Applications of magnet and electromagnets (recycling plants, loudspeaker, simple magnetic relay and D.C motor) • Electromagnetic Induction and its applications (A.C generator and transformer) • Acids, bases and salts: characteristic properties of acids and bases, and salt preparation
The students will have the opportunity to develop the following attitudes and dispositions:
• Confidently transferring experimental skills to unfamiliar contexts.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

ENTREPRENEURSHIP

Subject: Entrepreneurship

Subject outline:

A comprehensive understanding of entrepreneurship equips students with a range of key transferable soft skills relevant to the world of work. This subject will allow students to apply those skills in meaningful contexts across their cluster areas. They will benefit from input from guest speakers who are successful entrepreneurs and from research into chosen enterprises. They will understand the importance of entrepreneurs for economic development and growth. By identifying entrepreneurial opportunities within their own environment, they will apply their knowledge and skills to a relevant entrepreneurial project ideally linked to their cluster.

Guided Learning Hours: 2 periods per week

Core subject competencies:

1.0 Explain the concept of entrepreneur, list entrepreneurial attributes and ethical principles.
2.0 Develop a simple business plan.
3.0 Apply key marketing principles.
4.0 Perform basic accounting and comprehend basic business finance practices.

1.0: Explain the concept of entrepreneur, list entrepreneurial attributes and ethical principles.
What the students will be able to do:
1.1 Describe the concept of entrepreneurship and desirable attributes of an entrepreneur. 1.2 List examples of enterprises. in the local community. 1.3 Identify opportunities and challenges faced by an entrepreneur. 1.4 Describe a local enterprise in terms of needs, wants, scarcity, opportunity cost, choice, goods and services. 1.5 Recognise the role of networking for entrepreneurs. 1.6 Recognise business opportunities. 1.7 Generate innovative and creative business ideas. 1.8 List the stages in setting up an enterprise.
How the students may apply their knowledge and skills:
The students will apply the knowledge and skills through: - Brainstorming the different types of work carried out in their community and their plans for after their studies. - Interacting with guest speakers (entrepreneurs) - Self-assessment against entrepreneurial attributes. - Group activity to identify differences between needs and wants, goods and services.

Content and Range

- Attributes of an entrepreneur (communication, negotiation, risk taking, conflict management, ethical principles)
- Classification and legal structure of enterprises
- Benefits and challenges of an entrepreneur
- Needs, wants, goods and services
- Types of networks
- Importance of innovation and creativity
- Enterprise Process (identifying the problem and generating a business idea, exploring creative solutions, action planning, implementing the plan, monitoring progress, evaluation of success or failure)

The students will have the opportunity to develop the following attitudes and dispositions:

- Self-reflection on their interests and goals with respect to career choices
- Interpersonal skills through group activities.

2.0: Develop a simple business plan

What the students will be able to do:

2.1 Explain the meaning of a business plan and how it assists in start-up and growth.
2.2 Identify the users of a business plan.
2.3 Describe the elements of a business plan.

How the students may apply their knowledge and skills:

The student will apply the knowledge and skills through:

- Discovering the various activities of an enterprise.
- Identifying the different elements of a business plan from samples provided.
- Identifying a business idea and working in a small group on a specific part of the business plan to discuss the meaning and importance of planning.

Content and Range

- Purpose of a business plan
- Users of a business plan
- Elements of a business plan

The students will have the opportunity to develop the following attitudes and dispositions:

- Research skills.
- Interpersonal skills through group activities.

3.0: Apply key marketing principles.

What the students will be able to do:

3.1 Explain the meaning of market, production process, demand and supply.
3.2 Explain the practical importance of market research, market segmentation and the marketing mix.
3.3 Recognise the importance of innovation, copyrights and patents.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:
- Explaining the terms and market, production process, demand and supply.
- Producing an information leaflet on marketing mix.
- Undertaking a visit to a local enterprise and/or inviting a local entrepreneur as a guest speaker to the class.
- Linking the activities to their learning in their clusters.

Content and Range

- Market, production process, demand and supply
- Market research (primary and secondary)
- Branding
- New markets (export)
- Market segmentation (demographic and geographic)
- Marketing mix (product, price, place and promotion)
- Marketing strategies
- Innovative product, copyrights and patents

The students will have the opportunity to develop the following attitudes and dispositions:

- Creativity and communication skills.
- Research skills.
- Interpersonal skills through group activities.

4.0: Perform basic accounting and comprehend basic business finance practices.

What the students will be able to do:

4.1 Explain the significance of key business documents.
4.2 Explain types of business transactions and methods of payments.
4.3 Calculate costs, revenue, profits, and tax.
4.4 Select appropriate sources of finance.
4.5 Prepare simple financial statements.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:
- Researching sample business documents to identify financial information.
- Participating in role-play to demonstrate a range of business transactions.
- Brainstorming on the different sources of finance.
- Group activity to prepare simple financial statements related to an enterprise project.

Content and Range

- Business documents (quotation, order, invoice, receipt)
- Business transactions (cash, bank, and credit)
- Methods of payments (cash, cheques, electronic payment)
- Types of costs (Fixed cost, Variable cost, Total cost)
- Revenue, profit, and tax
- Sources of finance (internal and external)
- Simple financial statements (cash budget, receipt and payment and income statement)

The students will have the opportunity to develop the following attitudes and dispositions:

- Research skills.
- Interpersonal skills through group activity.
- Communication skills.
- Organisational skills to prepare financial statements.

Mode of Assessment

100%

1 portfolio continuously built and assessed throughout the programme in each subject (ICT, Art and Entrepreneur) within Essential skills.

THE ARTS

Subject: The Arts

Subject outline:

The Arts provide a unique way for students to explore, experiment, and express their creativity and imagination. In this practice-based subject, the competencies will be developed around one main project allowing them to acquire discipline-based competencies as well as soft skills. Students will be actively engaged in artmaking which will be enhanced through the use of technological tools; lectures by guest speakers; site visits and virtual tours to galleries and museums and interactive visits to artists' and designers' studios. These engagements foster professional and personal values and work ethics preparing flexible, creative, and innovative individuals for their potential engagement in creative industries.

Guided Learning Hours: 2 periods per week

Core subject competencies

1.0 Carry out in-depth research on a specific theme from an artistic perspective.

2.0 Use research to generate innovative ideas to create original compositions.

3.0 Experiment with a range of media, techniques and processes including technological tools and performing arts.

4.0 Produce an artwork based on informed artistic choices and decisions.

5.0 Employ effective communication for artwork presentations.

1.0 Carry out in-depth research on a specific theme from an artistic perspective.
What the students will be able to do:
1.1 Identify primary and secondary sources to collect ideas and information. 1.2 Record ideas for preliminary development of project work using appropriate tools.
How the students may apply their knowledge and skills:
The students will apply the knowledge and skills through: - Using artistic and technological media to visually and orally present key ideas of the research.
Content and Range
• Primary sources: direct observation, own photographs, site visits and interviews based on a theme and/or topic • Secondary sources: newspapers, magazines, artist references (visual and performing artists'/ designers' works), interviews, site visits to galleries, museums, studios and internet browsing • Sketching, photography and video recording as tools to record visual information • Records of information through prints, notes, annotations, and audio recordings
The students will have the opportunity to develop the following attitudes and dispositions:
• Display respectful behaviour towards people, sites, and the environment while conducting research and investigations. • Respect copyright and acknowledge sources of information used.

2.0 Use research to generate innovative ideas to create original compositions

What the students will be able to do:

2.1 Examine information gathered through research.
2.2 Sort and select ideas for the project.
2.3 Make informed decisions to ensure coherent sequencing of selected ideas.
2.4 Generate innovative ideas through initial sketches and creative body moves.
2.5 Use art elements and principles of design appropriately to compose potential compositions and designs.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Creating a mood board illustrating ideas, decisions and intentions through sketches and compositions.
- Composing a tableau vivant through creative body moves illustrating ideas, decisions and intentions.

Content and Range

- Creative process
- Art elements and principles of design
- Composition and design making
- Art analysis and selection of information for relevance to theme and/or topic
- Sketches, creative body movements and tableau vivant to generate innovative ideas
- Application of art elements and principles of design in composition and design-making

The students will have the opportunity to develop the following attitudes and dispositions:

- Show appreciation of composition and design making.
- Develop creative and divergent thinking.
- Employ problem-solving.
- Make informed decisions.

3.0 Experiment with a range of media, techniques and processes including technological tools and performing arts

What the students will be able to do:

3.1 Experiment with a range of media, techniques, materials, and processes to draw, paint and print to distinguish the specificities of each.
3.2 Use creative body expressions and movements to illustrate ideas and compositions.
3.3 Use voice modulation to communicate ideas with intention.
3.4 Apply different colour schemes for compositions and designs.
3.5 Employ a variety of technological tools to create compositions and designs and manipulate images.
3.6 Demonstrate technical abilities in using graphic software.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Experimenting with artistic processes, interacting with artists and/or designers and attending artistic performances.
- Documenting and reflecting on the creative journey through the presentation of a portfolio.

Content and Range

- Drawing media (pencil, coloured pencils, felt tip markers, pen and ink)
- Painting media (watercolour and poster colour)
- Printing (relief printing and stencilling)
- Design (poster, logo, illustration, leaflet)
- Using software for image-making and image manipulation
- Creative body posture, movement, and expression
- Voice modulation
- Tableau vivant

The students will have the opportunity to develop the following attitudes and dispositions:

- Show versatility in the process of experimentation.
- Be able to take risks to explore new ideas and techniques.

4.0 Produce artworks based on informed artistic choices and decisions.

What the students will be able to do:

4.1 Justify selected media, techniques, and processes for the outcome.
4.2 Adjust and refine ideas and compositions for project realisation based on self-evaluation and feedback from teachers and/or resource persons.
4.3 Realise a project in its final form by applying technical know-how

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Making final adjustments and refinements to the project through evaluation and feedback.
- Realising a cohesive final piece of work that displays an authentic and personal response.

Content and Range

- Personal response to selected drawing, painting and printing media, techniques and processes
- Analysis of work in progress for readjustments and refinements
- Annotation for clarification of ideas and intentions
- Creation of a project in its final form based on a theme and/or topic

The students will have the opportunity to develop the following attitudes and disposition

- Display time management and self-organisation.
- Engage in self-criticism through self-monitoring and evaluation.
- Appreciate and implement feedback constructively.

5.0 Employ effective communication for artwork presentations

What the students will be able to do:

5.1 Display and present the project work mindfully in its integral form using verbal and non-verbal communication.
5.2 Justify media, techniques and processes employed during the phase of realisation.
5.3 Justify choices and decisions taken for project realisation as a means of self-evaluation.
5.4 Respond relevantly and convincingly to questions on the project.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- A creative and authentic display of the final project through meaningful use of media.
- A defence presentation of the project to a panel using verbal and non-verbal communication.

Content and Range

- Display of project through appropriate media
- Defence presentation using verbal and non-verbal communication
- Creative body expression to communicate ideas
- Body language and nonverbal form communication

The students will have the opportunity to develop the following attitudes and dispositions:

- Show confidence in presenting own work and in responding to questions.
- Communicate efficiently and effectively about the project.
- Take pride in the presentation of own work.
- Develop self-awareness and growth through reflection on own performance.

Mode of Assessment

100%

1 portfolio continuously built and assessed throughout the programme in each subject (ICT, Art and Entrepreneur) within Essential skills.

INFORMATION AND COMPUTER TECHNOLOGIES (ICT)

Subject: Information and Computer Technologies (ICT)

Subject outline:

Technological advancements particularly digital technologies are opening new opportunities in various fields. Digital literacy, therefore, is gaining importance as a fundamental skill. The aim of this subject, Information and Computer Technologies (ICT), is to provide students with fundamental ICT competencies for the knowledge society. The competencies gained will be applicable in various domains of the Technology Education programme.

Guided Learning Hours: 2 periods per week

Core subject competencies:

1.0 Create and manage documents in the various fields of study.

2.0 Report production and data analysis using a spreadsheet.

3.0 Develop essential presentation and multimedia skills.

4.0 Data integration from multiple sources to produce content for the various fields of study.

1.0: Create and manage documents in the various fields of study
What the students will be able to do:
1.1 Demonstrate an understanding of features of word-processing applications. 1.2 Apply the knowledge of document production in the various fields of study.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: - Producing a document according to a given set of requirements. - Using appropriate formatting techniques to prepare documents for printing. - Working collaboratively through an online platform.
Content and Range
• Create a new document and edit an existing document • Formatting a document and using spell and grammar checks • Working with images, tables, shapes, smart art, charts and word arts • Working with references, table of contents, list of figures, headers and footers and footnotes • Sharing and working online
The students will have the opportunity to develop the following attitudes and dispositions:
• Ability to produce a document collaboratively • Produce error-free documents • Give attention to details • Ethics when working collaboratively • Develop problem-solving skills.

2.0: Report production and data analysis using a spreadsheet

What the students will be able to do:

2.1 Demonstrate an understand of features of spreadsheet applications.
2.2 Develop essential spreadsheet skills for data analysis in the various fields of study.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Creating of data models with appropriate formulae
- Organising data to produce information
- Filtering information on specific criteria
- Generating reports and graphs
- Working collaboratively using an online spreadsheet.

Content and Range

- Working with workbooks and worksheets
- Creation of data models on given problems
- Sorting and searching data
- Using filters to select a specific range of data
- Perform what-if analysis
- Using Vlookups and Hlookups
- Use a range of simplex and complex formula
- Reports and graphs
- Using various views and page layouts
- Printing selected information based on given criteria and using header and footer

The students will have the opportunity to develop the following attitudes and dispositions:

- Ability to work collaboratively.
- Give attention to details.
- Ethics when working collaboratively.
- Develop problem-solving skills.

3.0: Create multimedia content for the various fields of study

What the students will be able to do:

3.1 Develop an understanding of multimedia applications.

3.2 Create multimedia presentations according to a set of requirements.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Preparing presentation on a given theme
- Presenting using a presentation software
- Preparing a poster using a graphic software
- Printing a presentation on a given set of requirements
- Working collaborative on an online multimedia software.

Content and Range

- Slide layouts
- Animation
- Slide transition
- Inserting objects
- Creating posters
- Creation of video
- Online multimedia software
- Printing slides/handouts/notes pages/posters

The students will have the opportunity to develop the following attitudes and dispositions:

- Ability to work online
- Take pride in their creativity
- Appreciating how videos can be manipulated to display intended and unintended messages.
- Ethics when working collaboratively
- Develop problem-solving skills.

4.0: Data integration from multiple sources to produce content for the various fields of study

What the students will be able to do:

4.1 search for information on the Internet based on specific criteria

4.2 Integrate data from the Internet into a document or presentation

4.3 Integrate graphs and tables from a spreadsheet to a document or presentation.

4.4 Create a video using video editing software

4.5 Develop a document individually/collaboratively that uses data from desktop and online software, search from the Internet as well as print media.

How the students may apply their knowledge and skills:

The student will apply the knowledge and skills through:

- Performing search operations using a web browser
- Creating a consolidated document with graphs and charts
- Creating a presentation with charts and graphics
- Creating a video
- Working collaboratively and integrate data from various team members.

Content and Range

- Using search engine
- Use web browsers effectively
- Use data from a various sources
- Use images, videos and other graphic materials
- Use of storyboards
- Use online platforms for collaboration

The students will have the opportunity to develop the following attitudes and dispositions:
• Ethics when working online • Problem-solving skills • Research skills • Work collaboratively • Be creative • Select and use data appropriately.

Mode of Assessment

100%

1 portfolio continuously built and assessed throughout the programme in each subject (ICT, Art and Entrepreneur) within Essential skills.

FUNDAMENTALS OF ENGINEERING

Subject: Fundamentals of Engineering

Subject outline:

Engineering is a subject which is in essence practical. In this subject, students develop knowledge and skills through engagement with industry to learn about the many different types of engineering and their impact on our everyday lives. Students are equipped with key knowledge and skills to design products that are useful in solving real-life problems. They develop the competencies to create various technical drawings and models to explore solutions. They also examine the use of engineering materials and structures in the development of engineering solutions.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Recognise engineering as a field of professional practice.

2.0 Produce accurate technical drawings using conventions in engineering graphics.

3.0 Examine the use of different engineering materials.

4.0 Examine the use of structures in engineering.

5.0 Use the design process as a structured thinking process to solve problems.

6.0 Use modelling as a tool to explore and develop design solutions.

Core subject competency 1.0: Explore engineering as a field of professional practice
What the students will be able to do:
1.1 Recognise engineering activities in diverse engineering fields. 1.2 Identify the variety of careers in the engineering field. 1.3 Describe the attitudes and skills of professionals in engineering. 1.4 Explain the roles and responsibilities of different cadres in engineering.
How the students may apply their knowledge and skills:
• Researching specific engineering fields (group activity). • Producing an information leaflet on engineering areas and activities. • Effecting visits to various fields of engineering activities. • Simulation of engineering activities. • Talk by engineers on the profession.
Content and Range
• Engineering fields: civil, mechanical and electrical • Job prospects in engineering: technical, supervisory and associated jobs • Skill set of professionals in engineering • Roles of professionals in engineering with respect to supervision, health and safety • Attitudes of professionals in engineering, Code of Ethics • Responsibilities of engineers towards society and environment
The students will have the opportunity to develop the following attitudes and dispositions:
• Adopting a sense of curiosity to explore different career paths • Reflecting on their own interests and goals with respect to career choices • Developing interpersonal skills through group activities • Being sensitive to implications of engineering practices on human activity

Core subject competency 2.0: Produce accurate technical drawings using conventions in engineering graphics

What the students will be able to do:

2.1 Explain the importance of technical drawings in engineering applications.
2.2 Use drawing equipment to construct accurate pictorial projections.
2.3 Produce exploded views to communicate clearly design ideas clearly.
2.4 Draw accurate orthographic drawings.
2.5 Insert dimensions on pictorial and orthographic drawings using conventions.
2.6 Produce assembly drawings.
2.7 Create visually appealing freehand sketches using different rendering techniques.
2.8 Use digital tools and software for 2D engineering drawings.

How the students may apply their knowledge and skills:

- Produce engineering drawings such as architectural design and product design for effective technical communications.
- Interpret technical drawings relevant to engineering fields.
- Visit architectural/mechanical, electrical and plumbing (MEP) offices.
- Keeping a drawing portfolio.

Content and Range

- Pictorial projection: Isometric, Cabinet Oblique, One-point and Two-point perspective, Planometric and Exploded views
- Orthographic projection: 1st and 3rd angle projections, dimensioning
- Assembly drawings
- Freehand sketching
- Rendering techniques: tone shading, thick and thin technique
- Digital tools and software: CAD software for the producing of 2D engineering drawings: layout, dimensions, scaling and other relevant features, Adobe Illustrator and SketchUp

The students will have the opportunity to develop the following attitudes and dispositions:

- Be conversant with technical drawings.
- Produce efficient engineering drawings with appropriate views for effective communication.
- Attention to details and accuracy when working with pictorial and orthographic representations.
- Visual thinking and spatial reasoning skills to manipulate pictorial and orthographic representations.
- Ethical practices when using digital drawing tools and software.

Core subject competency 3.0: Examine the use of different engineering materials
What the students will be able to do:
3.0 Identify properties and applications of common engineering materials. 3.1 Investigate various forms, types, and sizes of locally available engineering materials. 3.2 Select engineering materials to design and make products.
How the students may apply their knowledge and skills:
- Investigate the types of materials used on existing designs. - Recognise different engineering materials available locally. - Make a presentation on engineering materials available locally.
Content and Range
• Types of paper and cards • Types of timber, conversion of timber, seasoning of timber, manufactured boards • Ferrous metals and non-ferrous metals, heat treatment of metals • Thermoplastics and Thermosetting plastics • Properties and characteristics of concrete and components of concrete mixes • Properties and characteristics of smart materials.
The students will have the opportunity to develop the following attitudes and dispositions:
• Learn through enquiry and product investigation. • Work in groups. • Simulation and role play.

Core subject competency 4.0: Examine the use of structures in engineering.
What the students will be able to do:
4.0 Explain the importance of structures in engineering applications. 4.1 Identify different types of structures and their characteristics. 4.2 State the types of loads acting on a structure. 4.3 Determine the load distribution in the members of a structure.
How the students may apply their knowledge and skills:
- Analyse existing structures. - Participate in a site visit to investigate different types of structures. - Draw free body force diagram to determine forces in structures. - Model structures to sustain a particular load application.
Content and Range
• Types of loads – concentrated and distributed loads, static and dynamic loads • Types of structures • Concurrent forces and coplanar forces • Bow's notation, space diagram in beams, force diagram, funicular polygon, struts, ties and redundant members
The students will have the opportunity to develop the following attitudes and dispositions:
• Environmental consciousness • Precision in executing tasks • Awareness of safety protocols.

Core subject competency 5.0: Use the engineering design process as a structured thinking process to solve problems

What the students will be able to do:

5.0 Understand the importance of the engineering design process in solving problems.
5.1 Describe the different stages of the engineering design process.
5.2 Use the design process to solve engineering problems.

How the students may apply their knowledge and skills:

- Using real-life objects and scenarios to exemplify the use of the design process.
- Identifying problematic situations relevant to engineering fields from real-life examples.
- Investigating designs from the immediate environment and real life.
- Hands-on activities involving modelling of design ideas.
- Produce a portfolio for effective design communication.

Content and Range

- The engineering design process: Ask, research, imagine, plan, create, test and improve

The students will have the opportunity to develop the following attitudes and dispositions:

- Determination to learn independently
- Learning through enquiry and product investigations
- Activity–based learning
- Sense of curiosity.

Core subject competency 6.0: Use modelling as a tool to develop design solutions

What the students will be able to do:

6.1 Use of practical modelling skills for the development of engineering solutions features.
6.2 Evaluation and testing of models for selection of appropriate design.

How the students may apply their knowledge and skills:

- Investigating modelling materials
- Making models using appropriate construction techniques
- Assess the serviceability and performance of models.

Content and Range

- Types of modelling
- Functions of modelling
- Modelling materials
- Modelling tools and equipment
- Construction techniques for simple mock-ups
- 3D printing modelling of simple solutions to set problems
- Testing and evaluation of models

The students will have the opportunity to develop the following attitudes and dispositions:

- Learning through enquiry and practical exercises
- Working in groups
- Simulation and testing.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

ENGINEERING APPLICATIONS

Subject: Engineering applications

Subject outline:

Engineering Applications will have a practical focus. Students will be engaged in the design and manufacture of objects. They will make use of simulations and virtual reality to enhance their knowledge of engineering applications in the real world. This subject provides students with ample opportunities for hands-on activities to develop technical competencies in engineering applications using various materials, tools, equipment, processing techniques and manufacturing technologies. Students devise solutions to problems through the exploration and use of mechanisms, electricity, electronics, hydraulic and pneumatic systems. Health and safety are core considerations in this subject.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Demonstrate skills in manufacturing practices.

2.0 Examine engineering applications of common mechanical components.

3.0 Discover the use of electricity and electronic systems in engineering applications.

4.0 Explain the functions of pneumatic and hydraulic systems in engineering.

1.0: Demonstrate skills in manufacturing practices
What the students will be able to do:
1.1 Demonstrate processing techniques related to engineering materials. 1.2 Use laser cutter technologies in manufacturing practices. 1.3 Join and assemble different engineering materials. 1.4 Select and apply appropriate finishes. 1.5 Observe safe lab practices and personal safety.
How the students may apply their knowledge and skills:
- Performing hands-on activities using different engineering materials such as: card, solid timber, manufactured boards, metal sheets, metal profiles, acrylic sheets, and GRP. - Undertaking visits related to a few fields of manufacturing practices. - Visualizing videos about various manufacturing practices. - Applying a range of manufacturing practices to solve design problems.
Content and Range
• Personal safety and safe lab practices. • Processing techniques: measuring, marking, cutting, shaping, forming, bending, and joining. • Plastic processes: injection moulding, compression moulding, blow moulding and calendering. • Laser cutting of materials (Tinkercad). • Permanent and temporary joints. • Finishing and application techniques.
The students will have the opportunity to develop the following attitudes and dispositions:
• Adopting safety attitude. • Reflecting on learning experiences and skills acquired. • Developing interpersonal and collaborative skills.

2.0: Examine engineering applications of common mechanical components

What the students will be able to do:

2.1 Identify different types of mechanical components and their functions.
2.2 Explain different types of motion.
2.3 Recognise standard symbols of mechanical components and cam profiles.
2.4 Define the principles of mechanical advantage, velocity ratio and efficiency in mechanisms.

How the students may apply their knowledge and skills:

- Examining existing mechanical components in everyday life applications.
- Considering changes in motion produced by different types of mechanisms.
- Carrying out independent research work for different types of mechanical components and motions.
- Reverse engineering of mechanical components.
- Drawing of standard symbols of mechanical components and cam profiles.
- Calculating mechanical advantage, velocity ratio and efficiency in mechanisms.
- Applying mechanism concepts to design and make an artefact.

Content and Range

- Mechanical components and functions: levers, cams, gears, pulleys, linkages, screws, chain, and sprocket
- Types of motion: linear, rotary, reciprocating and oscillating
- Standard symbols of mechanical components and cam profiles
- Principles of mechanical advantage, velocity ratio and efficiency in mechanisms

The students will have the opportunity to develop the following attitudes and dispositions:

- Being conscious of risks and hazards associated with mechanical components.
- Recognising application of mechanical components in everyday life situations.

3.0: Discover the use of electricity and electronics systems in engineering applications

What the students will be able to do:

3.1 Define basic concepts in electricity and electronics
3.2 Identify common electrical and electronic components/fittings and their standard symbols
3.3 Recognise various electrical and electronics tools and safe practices
3.4 Describe the use of automated systems and robotics in engineering applications.

How the students may apply their knowledge and skills:

- Examining existing electrical and electronic components: switches, relays, capacitors, diodes, LED, LDR, transistors speakers and sensors.
- Using a multimeter to measure current, voltage and resistance.
- Drawing an electric and electronic circuit diagram.
- Observing safe practices related to electricity and electronics tools.
- Constructing a simple electronic circuit using a bread board such as: humidity/water sensor, smoke detector, alarm system etc.
- Applying electrical concepts to design and make an electrical circuit board.

Content and Range

- Standard symbols of electrical and electronics components
- Electronic and electrical circuit diagrams
- Tools in electricity and electronics and their safe use
- Methods and techniques: soft soldering, wire cutting /connections
- Electric circuit board and bread board for electronic circuits
- Automated system and robotics

The students will have the opportunity to develop the following attitudes and dispositions:

- Recognising real-life application of electricity and electronics.
- Adopting and maintaining safe work practices when dealing with electricity and electronics.

4.0: Explain the functions of pneumatic and hydraulic systems in engineering

What the students will be able to do:

4.1 Explain the basic principles of operation and applications of pneumatic and hydraulic systems.
4.2 Identify the advantages and limitations of pneumatic and hydraulic systems.
4.3 Distinguish between hydraulic and pneumatic systems
4.4 Explain the working principle of an air compressor
4.5 Design models to simulate simple pneumatic and hydraulic circuits

How the students may apply their knowledge and skills:

- Observing real-world scenarios and machines to understand pneumatic and hydraulic systems.
- Visualising videos on pneumatic and hydraulic systems.
- Visiting industries where pneumatic and hydraulic systems are used.
- Drawing simple pneumatic circuit diagrams.
- Carrying out simple calculations related to hydraulics and pneumatics systems.
- Reverse engineering in pneumatic and hydraulic systems.
- Modelling of pneumatic /hydraulic systems.

Content and Range
• Principle of operation of pneumatic and hydraulic systems • Advantages and limitations of pneumatic and hydraulic systems • Applications of pneumatic and hydraulic systems in real-life context • Difference between hydraulic and pneumatic systems • Standard symbols and diagrams for pneumatic and hydraulic components • Working principle of air compressors • Calculations of forces generated during the out-strokes and in-strokes by pistons • Determination of diameter of cylinder required to excert a certain force • Modelling simple pneumatic and hydraulic systems: brakes, presses, lifting and construction devices using simple components like syringes
The students will have the opportunity to develop the following attitudes and dispositions:
• Recognising application of pneumatic and hydraulic systems in machines and industries. • Being aware of protocols related to field/industrial visits.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

ENGINEERING AND SUSTAINABILITY

Subject: Engineering and Sustainability

Subject outline:

In this subject, students learn about the impact of engineering on the main pillars of sustainability: Environment, Society and Economy. Sustainability practices aim to reduce the depletion of natural resources. The long-term intention is to minimise the effects of engineering, construction, and manufacturing industries on the environment for the future generations. This subject offers students opportunities to gain insights into eco-friendly practices, materials, and their different applications. Students are equipped to develop real life solutions to problems related to society and the protection of the environment. They develop their knowledge and skills in real world contexts, engaging in industrial visits and benefiting from inputs from guest speakers with relevant experience.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Examine how engineering, manufacturing and construction industries affect the environment and society.

2.0 Demonstrate knowledge of eco-friendly production processes in manufacturing simple sustainable products and systems.

3.0 Apply innovative sustainability processes to minimise harmful effects in industrial and domestic activities.

1.0: Examine how engineering, manufacturing and construction industries affect the environment and society
What the students will be able to do:
1.1 State the strengths and weaknesses of engineering, construction, and manufacturing industries on the local environment. 1.2 Discuss different types of pollution, their causes, and negative impacts. 1.3 Describe the impacts of 'green washing', carbon footprint and embodied carbon. 1.4 Discuss the major impacts of the plastic industry on the environment and the society. 1.5 Identify alternative eco-friendly measures and materials for specific products and systems. 1.6 Examine the effects of technology and industries on health (mental and physical), at both individual level and societal level. 1.7 Investigate consumer trends and consequences.

How the students may apply their knowledge and skills:

- Researching the impact of specific engineering, construction, and manufacturing industries – power generation, transport, and food (group activity) on the environment.
- Researching carbon footprint and embodied carbon contributions of various stakeholders in local engineering industries.
- Drawing of charts and posters to sensitise and develop awareness about pollution, its causes, and effects.
- Designing posters and leaflets to sensitise the public on the effects of technology and industries on society.
- Conducting visits to observe how 2 of the following industries (manufacturing, energy, power generation, transport) minimise their environmental impact.
- Participating in community projects and sensitisation campaigns to protect the environment
- Reflecting on learning experiences.

Content and Range

- Types of pollution – air, water, land, and noise
- Causes and effects of pollution in different industries – construction, transport, fossil fuels, plastics, cooling and heating and food
- Climate change and global warming
- Reducing pollution in everyday life on land, air, sea, and water
- Green washing approach, carbon footprint and embodied carbon impact caused by these industries
- Biodegradable, non-biodegradable plastics, single-use plastics, recyclable plastics, segregation, and symbols
- The impact of technology, manufacturing, and construction industries on the wellbeing of society, health, and consumer trends
- Product life cycle, including their costs implications

The students will have the opportunity to develop the following attitudes and dispositions:

- Creating a sustainability culture.
- Being conscious about taking care of one's immediate environment.
- Being sensitive to the cause of protecting one's environment against plastic invasion in everyday life, including protection of the marine and aquatic life.
- Being sensitive to implications of engineering practices on human activity.
- Conducting site visits to industries to observe how they minimise damage to the environment.
- Developing problem solving and communication skills.
- Adopting proper attitude and behaviour with respect to the environment and society.

2.0: Demonstrate knowledge of eco-friendly production processes in manufacturing simple sustainable products and systems

What the students will be able to do:

2.1 Identify sustainable practices in current industries.
2.2 Describe simple eco-friendly and sustainable products and systems.
2.3 Describe how eco-friendly materials are processed into products and systems.
2.4 Explain the usage, disposal and/redistribution of excess products and waste management.
2.5 Use R's approaches when solving design problems.
2.6 Describe how green and blue sources of energy are converted into electricity and for heating or cooling purposes.
2.7 Draw simple schematic diagrams to show the energy conversions and energy losses, with respect to different green or blue energy sources.
2.8 Design and make prototypes to model the conversion of green or blue energy sources.

How the students may apply their knowledge and skills:

- Producing informative sketches, signs, and symbols to promote sustainable, eco-friendly practices and documenting ways to protect the environment through proper waste management protocols.
- Designing and making sustainable and eco-friendly prototypes, products, and systems.
- Upcycling waste products and materials into new products, e.g., old bicycle into plant shelves.
- Liaising with and visiting local waste treatment and/collecting companies to encourage domestic and industrial waste management.
- Conducting visits to power stations – solar farms, wind stations, and hydropower stations to observe power conversion systems.
- Modelling of energy conversions for electricity production.

Content and Range

- Cleaner production, eco-friendly and sustainable practices
- Green products and materials including those locally available – bamboo, coconut coir, banana fibre, sugar cane, clay, algae, straw and palm leaves
- Strengths and limitations of eco-friendly and sustainable products and systems
- Waste management – discarding, recycling, destroying and segregation of water, plastics, food, textiles and e-products
- The R's definitions and applications: rethink, refuse, reduce, reuse, repair, repurpose, recover, replace, recycling, and other R's
- Upcycling definition and applications in real-life problem solving
- Sources of green and blue energy: wind, solar, water, waves, tidal, geothermal, biomass, biogas, bagasse, and bamboo and applications
- Forms of energy and energy conversion charts

The students will have the opportunity to develop the following attitudes and dispositions:

- Promoting sustainable practices amongst peers in everyday life
- Choosing eco-friendly products and practices whenever possible
- Adopting the 'green' attitude and R's strategies in everyday life
- Promoting waste minimisation in everyday actions
- Considering conservation of the ecosystem.

3.0: Apply innovative sustainability processes to minimise harmful effects in industrial and domestic activities

What the students will be able to do:

3.1 Recognise the aim of Mauritius to achieve the 2030 green energy goals.
3.2 Investigate practices undertaken to reach the 2030 energy and SDG 7 goals.
3.3 Consider eco-friendly systems in building services.
3.4 Describe and apply sustainable agricultural practices.
3.5 Design and make eco-friendly and sustainable products and/prototypes and systems.
3.6 Test and evaluate sustainable products and systems.

How the students may apply their knowledge and skills:

- Designing and making eco products and systems.
- Carrying out simple sustainable projects as activity-based learning (group)
- Site visits to agricultural farms to observe sustainable production processes.
- Applying sustainable agricultural practices in projects and/ community-based projects.
- Choosing environmentally friendly appliances and using them effectively.
- Demonstrate knowledge of MauriGAP (Mauritius Good Agricultural Practices) standards.

Content and Range

- Eco-friendly practices in domestic and industrial contexts
- Processing and the utilisation of eco-materials- bamboo, coconut coir, banana fibre, sugar cane, clay, straw, recycled plastics, recycled timber, recycled paper, and eco blocks
- Building services – rainwater harvesting, water recycling, natural lighting, wastewater treatment and air conditioning
- Green alternatives and technological innovations to reduce fossil fuel dependency.
- Policies, energy and SDG 7 goals
- Simple sustainable agricultural practices -hydroponics, vertical gardens, water recycling, composting, and organic agriculture

The students will have the opportunity to develop the following attitudes and dispositions:

- Choosing green alternatives for a sustainable future
- Being aware of the responsibilities of engineers and/designers towards the sustainable use of materials and other resources.
- Reflecting on the implementation of eco-friendly practices in everyday life.
- Adopting sustainable agricultural practices
- Developing interpersonal skills through group activities.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

HEALTH AND WELLNESS

Subject: Health and Wellness

Subject outline:

Health and Wellness emphasises three dimensions of health namely, mental, physical, and social. These dimensions are interconnected for the individual's wellbeing and balanced life. Students will engage in activities such as mindfulness practices, self-care, and stress management techniques to promote well-being in all aspects. It will also enable students to learn about reproductive health. Moreover, students will gain knowledge about the benefits of physical activity, balanced diet, other lifestyle health factors (e.g., avoiding smoking and excessive alcohol consumption) and traditional medicine, which significantly reduce the risk of developing diseases. Students will also be exposed to the diversity of careers in health and wellness services.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Describe the basic concepts of health and wellness to better understand adolescents' mental, physical, social and reproductive health.

2.0 Design recipes, prepare and cook healthy meals in relation to health and wellness.

3.0 Plan and execute activities promoting healthy lifestyle .

4.0 Demonstrate basic health care skills.

5.0 Explore the scope and diversity of careers in health and wellness services.

1.0: Describe the basic concepts of health and wellness to better understand adolescents' mental, physical, social and reproductive health.
What the students will be able to do:
1.1 Define adolescence and relate it to physical changes in the body 1.2 Explain the reproductive systems. 1.3 Identify the emotional changes which take place during adolescence. 1.4 Explain the importance of healthy relationships in maintaining mental, social and physical health and wellbeing.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: • Developing a poster/flyer on how to care for different parts of the body. • Collaborating with peers through role play to cope with challenges in building and maintaining. healthy relationships with friends and families. • Creating videos/ podcast to explore ways to improve mental health.

Content and Range

- Adolescence: mental, emotional, physical, social and reproductive system.
- Common health challenges for adolescents: teenage pregnancy, body image, and sexually transmitted diseases.
- Healthy relationship with peer group and family: trust, communication, respect, and support, and citizenship values.
- Mental health: youth mental health, bullying, academic stress, and early intervention.

The students will have the opportunity to develop the following attitudes and dispositions:

- Valuing and respecting one's body
- Appreciating a healthy lifestyle for a healthy body
- Adopting strategies for better mental health.

2.0: Design recipes, prepare and cook healthy meals in relation to health and wellness

What the students will be able to do:

2.1 Describe the digestive system.
2.2 Outline the dietary guidelines and the plate model.
2.3 Define balanced meals, balanced diets and special diets (Vegetarians and people with lactose intolerance and gluten intolerance).
2.4 Prepare and cook special diets.
2.5 Explain religion-based and cultural diets in Mauritius.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Designing a portfolio which englobes:
  i. Explaining the process of digestion and absorption by the use of relevant diagrams.
  ii. Planning balanced meals by using 'the plate model' and dietary guidelines.
  iii. Designing healthy recipes for religious-based and cultural diets in Mauritius.
- Planning, preparing and cooking balanced diets for different age groups, vegetarians and people with lactose/gluten intolerance.

Content and Range

- Digestive system: main digestive organs and their roles; digestion and absorption of nutrients.
- Dietary guidelines: nutrients and the three food groups
- Healthy recipes: recipe modification for religious-based and cultural diets in Mauritius
- Balanced diets for: different age groups, vegetarians and people with food allergies and intolerances

The students will have the opportunity to develop the following attitudes and dispositions:

- Enjoying and adopting healthy eating habits
- Appreciating various types of meals
- Sharing knowledge and hands on practices in meal planning and preparation.

3.0: Plan and execute activities promoting healthy lifestyle

What the students will be able to do:

3.1 Engage in physical activity to promote health and wellbeing.
3.2 Identify negative effects of substance abuse and addiction on the body and society.
3.3 State ways to prevent addictive and risky behaviours.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

I. Performing indoor and outdoor physical activities.
II. Preparing an infographic which summarises the consequences and prevention of addictive and risky behaviours.

Content and Range

- Physical activities: indoor and outdoor. Age-specific recreational activities for well-being including dance, yoga and swimming
- Negative effects of addictive behaviours and substance abuse: mental health problems, family and social issues and individual health imbalances
- Prevention of addictive behaviours and substance abuse: appropriate behavioural changes through education and counselling

The student will have the opportunity to develop the following attitudes and dispositions:

- Valuing indoor and outdoor physical activities.
- Adopting a zero-tolerance strategy for healthy living and a healthy society

4.0: Demonstrate basic health care skills

What the students will be able to do:

4.1 Demonstrate basic health care skills: universal precautions, First Aid, Infection Prevention and Control (IPC).

4.2 Explain the importance of a healthy community and its impact of the society.

4.3 Describe traditional medical practices and the importance of Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy (AYUSH) to cure common diseases.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Demonstrating and practising universal safety precautions, basic principles of First Aid and IPC in laboratories
- Creating educational videos for Eco-friendly habits, safe home remedies and AYUSH to cure common diseases

Content and Range

- Universal precautions: use of Personal Protective Equipment, maintaining proper personal hygiene as well as applying the basics of sanitary protocols
- First Aid essentials: treat simple burns, minor wounds and bleeding
- Healthy community behaviours and the creation eco-friendly habits: application of (Rs) concepts for better environmental health (Conserve energy, reduce water and food waste, recycling, and repairing)
- Traditional medical practices and Concept of AYUSH

The students will have the opportunity to develop the following attitudes and dispositions:

- Valuing the importance of health care and first aid skills.
- Protecting the environment through healthy community behaviours and eco-friendly habits.
- Promoting traditional medicine and practices from AYUSH for well being.

5.0: Explore the scope and diversity of careers in health and wellness services

What the students will be able to do:

5.1 Identify the wide range of services offered in the health and wellness sectors.

5.2 Recognise the different career opportunities in selected areas in the health and wellness sectors (medicine, nursing, pharmacy, and allied health fields).

5.3 Compare and contrast the contribution of selected professions within the health and wellness sectors in improving the quality of life of the general population.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Participate in site visits in appropriate health establishments as observers to recognise the range of services offered in the health sector and roles of health carers in the society.
- Participate in role plays, create posters and videos to recognise the contribution of different professionals in the health and wellness sectors.

Content and Range

- Health services – public and private sectors, antenatal, postnatal, paediatric, teenage, adult and elderly care, and different fields [hospitals, clinics, laboratory, pharmacy, dentistry, residential care facilities]
- Wellness services – fitness, sports, and recreational activities.
- Professions – carer, nurse, sports coach/instructor, Health and Wellness counsellor

The students will have the opportunity to develop the following attitudes and dispositions:

- Valuing the various services provided within the health and wellness sectors.
- Appreciating the roles and responsibilities of the different professionals within the health and wellness sectors.
- Developing a mindset for future engagement in any health-related professions.

Mode of Assessment

50%	50%
1 portfolio continuously built and assessed throughout the programme	Written Examination

HOSPITALITY AND CULINARY TECHNIQUES

Subject: Hospitality and Culinary Techniques

Subject outline:

Hospitality & Culinary Techniques offer a comprehensive introduction to the exciting world of the hospitality industry. Students will gain a deep understanding of the principles and practices involved in the four main functional areas of hospitality namely: Housekeeping, Front Office, Food and Beverage Service and the Kitchen. Students will gain practical skills and knowledge in Culinary Techniques involved in the preparation of nutritious and appealing dishes. The subject prepares students for potential careers or further studies in Hospitality, Travel and Tourism and Food Studies sectors Additionally, the course fosters creativity, teamwork, and a passion for excellence, setting the stage for lifelong learning and professional growth.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1. Explain the key components of the hospitality industry and identify associated career opportunities.
2. Acquire skills and techniques in respective functionals departments in Hospitality (Housekeeping, Front Office and Food and Beverage Service).
3. Manipulate the appropriate kitchen tools and equipment in the preparation of dishes.
4. Use appropriate cooking methods and culinary techniques to prepare, cook and serve nutritious and appealing dishes.

1. **Explain the key components of the hospitality industry and identify associated career opportunities.**
What the students will be able to do:
1.1 Describe the hospitality industry and associated career opportunities. 1.2 Identify the characteristics of different types of accommodation (hotel, resort, IRS, lodges, treehouses, bungalows, apartments, guesthouses, or Airbnb). 1.3 List the different types of catering services (wedding, corporate, event, and outdoor). 1.4 Prepare the organisational structure of different hotels as per the Star Rating. System. 1.5 List the distinct attributes of different job roles within the main functional areas of hotels (Front Office, Food and Beverage, Housekeeping, or Kitchen). 1.6 State opportunities and challenges of each functional area.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: • Undertaking a visit to any accommodation to observe and apply knowledge of topics covered from 1.1 to 1.5. • Working collaboratively to outline key features observed and summarise the information in creative ways. • Conducting practical sessions with hands-on skills by utilising the demonstration facilities provided at educational institutions like Hotel School (MITD) and Polytechnics Mauritius Ltd (PML).

Content and Range

- Introduction to the hospitality industry and career prospects.
- Types of accommodation and catering services – (hotel, resort, IRS, lodges, treehouses, bungalows, apartments, guesthouses, Airbnb and catering services)
- Overview of the products and services offered by the different functional areas:
  1. Front Office
  2. Housekeeping
  3. Food and Beverage
  4. The Kitchen
- Overview of the back-office operations that support the functional areas (Reservation, Sales & Marketing, Procurement, Human Resources, Finance, Security)
- Opportunities and Challenges faced by each functional area (Guest Satisfaction / Complaints, Cleanliness & Comforts/Maintain Standards, Diverse Dining Options/Competition, Menu Options/Product Quality).

The students will have the opportunity to develop the following attitudes and dispositions:

- Sense of curiosity to explore different career prospects in the hospitality Industry.
- Appreciate the contribution of the hospitality industry to society, environment and economy.
- Proper grooming and presentation.
- Think creatively and come up with innovative solutions.
- Commit to delivering excellent service.

2.0. Acquire skills and techniques in respective functionals department in Hospitality (Front Office, Housekeeping and Food and Beverage Service).

What the students will be able to do:

2.1 Use appropriate vocabulary and terminology relevant to the respective functional areas.

2.2 State the products and services offered in each functional area.

2.3 State the stages that a guest goes through from the initial reservation to their departure.

2.4 Demonstrate the principles and practices of different room cleaning procedures including dusting and cleaning of furniture, bed-making, sweeping and mopping floors.

2.5 Apply the common food and beverage procedures that include table set up, order taking and sequence of service.

2.6 Outline the implications of proper hygiene and sanitation in these functional areas.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Watching Online Videos and resources that show step-by-step procedures and techniques in Front-Office, Housekeeping and Food and Beverage Service.
- Role-playing (involving guests and employees), and class simulations.
- Conducting practical sessions, hands-on skills by utilising the demonstration facilities provided at educational institutions like Hotel School (MITD) and Polytechnics Mauritius Ltd (PML).
- Manipulating all tools and equipment safely.

Content and Range

- Front Office Procedures
  - Pre-arrival (Telephone Etiquette & Reservation procedures)
  - Arrival (Welcoming of Guests & Check-in procedures)
  - Occupancy (Address Guests needs & Requests)
  - Departure (Payment & Check-out procedures)
- Housekeeping Procedures
  - Room Features and Amenities (For different types of rooms)
  - Sequence of Room Cleaning, Dusting and Sanitizing
  - Bed-Making
  - Sweeping and mopping of floors.
- Food and Beverage Procedures
  - Types, characteristics and usage of basic cutleries, glassware and plates
  - Table set up (Breakfast, Lunch and Dinner)
  - Seating procedures
  - Order taking
  - Sequence of service
- Safety and Hygiene:
  - Personal Protective Equipment (PPE) (Gloves, Apron, Masks)
  - Well-Being of Guests and Employees
- Tangible aspects of Products and Intangible aspects of Service

The students will have the opportunity to develop the following attitudes and dispositions:

- Visual attention to details through observation sessions.
- Effective verbal and non-verbal communication during role-playing.
- Develop a sense of teamwork through group presentations and reports.
- Build self-confidence in the provision of service through hands-on experiments.
- Lasting relationships with guests by adopting the right attitudes.

3.0 Manipulate the appropriate kitchen tools and equipment used for the preparation and cooking of dishes.

What the students will be able to do:

3.1 Describe the correct use and manipulation of kitchen tools.
3.2 Explain the choice, use, care and safety features of selected large and small kitchen equipment (cookers, thermostatic control and automatic time-controlled ovens, microwave ovens, slow electric cook pots, refrigerators and freezers, small kitchen equipment and tools, small electrical kitchen equipment).
3.3 Draw kitchen layout to optimize resources.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Designing kitchen layouts to optimize resources (work surfaces, flooring, walls, electrification, lighting, and ventilation).
- Developing manipulative skills; hands-on activities (how to use cookers, microwave ovens, small kitchen equipment and small electrical equipment).
- Implementing personal hygiene, kitchen hygiene and food safety principles when in the kitchen.

Content and Range

- Organisation of cooking area and equipment for efficient work
- Work surfaces, flooring, electrification, lighting and ventilation
- Choice, use, care and safety features of kitchen tools and equipment
- Personal hygiene, kitchen hygiene and food safety

The students will have the opportunity to develop the following attitudes and dispositions:

- Efficient communication of ideas through drawings.
- Attention to detail during planning of the kitchen area to optimize resources.
- Visual thinking and spatial reasoning skills to plan the kitchen set up.
- Employ problem solving skills to avoid accidents when in the kitchen.
- Maintain personal hygiene, kitchen hygiene and food safety during the preparation of dishes.

4.0: Use culinary methods and techniques to prepare, cook, and serve nutritious and appealing dishes.

What the students will be able to do:

4.1 Describe different ways heat is transferred – conduction, convection and radiation.

4.2 Explain different methods of cooking.

4.3 Explain the different techniques involved in making basic mixtures (cookies, biscuits, scones, cakes, pastries, batters, yeast dough, sauces).

4.4 Explain nutritive value, composition and structure of selected foods (dairy, products, eggs, fish, meat, soya, cereals (maize, millets, oats, rice, wheat) fruits and vegetables, pulses and nuts, fats and oils).

4.5 Prepare dishes made up of selected foods from 4.4.

4.6 Describe how garnishes and decorations add value to a dish.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

Conducting practical sessions to prepare a recipe portfolio consisting of:

- Dishes made by different cooking methods and foods.
- Dishes using different mixtures for cakes, pastries, batters, sauces, biscuits, scones, sauces, batters and yeast dough.
- Ideas for decorative and garnishing techniques.

Content and Range

- Reasons for cooking food
- Conduction, convection and radiation
- Methods of cooking (boiling, steaming, stewing, braising, roasting, baking, frying, simmering, grilling, slow cooking, poaching, pressure cooking, micro-wave cooking
- Food commodities - (dairy products, eggs, fish, meat, soya; cereals (maize, millets, oats, rice, wheat); fruits and vegetables, pulses and nuts; fats and oils
- Dishes made from the different food commodities (Starters, appetizers, soups, main dishes, accompaniments, beverages and desserts)
- Techniques involved in the preparation of basic mixtures (cookies, biscuits, scones, cakes, pastries, batters, yeast dough and sauces)
- Garnishes and decorations

The students will have the opportunity to develop the following attitudes and dispositions:

- Valuing the importance of food garnishes and decorating.
- Display time management and self-organisation.
- Appreciate the contribution of safe and economic food practices towards sustainability.
- Develop proper time management skills.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

LEISURE AND RECREATION

Leisure and Recreation

Subject outline:

Leisure and Recreation play a central role in communities and contribute to the well-being of individuals. This subject will take students on a fascinating journey through the diverse characteristics and realms of Leisure and Recreational operations. Students will develop fundamental knowledge and skills for planning and conducting successful Leisure and Recreational activities in their local communities. As students immerse themselves in real-world scenarios, they will be aware of the competencies required to embrace a career within this exciting industry. This subject will prepare students for a journey that fosters professional growth and unlocks promising opportunities in the world of Leisure and Recreation.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0: Examine the importance of the Leisure and Recreation industry.

2.0: Develop an understanding of the operation of the Leisure and Recreation industry.

3.0: Organise a Leisure and Recreation activity.

4.0: Outline the career opportunities and competencies required in the Leisure and Recreation industry.

1.0: Examine the importance of the Leisure and Recreation industry
What the students will be able to do:
1.1 Outline the evolution of the Leisure and Recreation industry. 1.2 Identify the service providers of Leisure and Recreation activities. 1.3 Outline the importance of Leisure and Recreation activities in meeting diverse needs. 1.4 Explain the impact of the Leisure and Recreation industry on the economy, society, culture, and environment. 1.5 Discuss the opportunities and challenges faced by Leisure and Recreation providers.
How the students may apply their knowledge and skills:
Students may apply their knowledge and skills by: - Carrying out a presentation on the evolution of the Leisure and Recreation industry (group work). - Undertaking field trips to different Leisure and Recreation service providers. - Mind mapping on the products and services provided by different service providers. - Creating customer profiles and outlining the unique needs and preferences of each when seeking Leisure and Recreation options (group work). - Debating on the impacts of Leisure and Recreation on the economy, society, culture, and environment (pair work). - Analysing case studies to identify the opportunities and challenges faced by the Leisure and Recreation providers (group work).

Content and Range

- Evolution of the Leisure and Recreation industry
- Types of Leisure: Social Leisure, Cognitive Leisure, and Physical Leisure
- Types of Recreational activities: Indoor and outdoor activities for example, sports (e.g., Foot-5, volleyball, badminton), games (e.g., traditional games, treasure hunt, Pictionary, puzzles), kids clubs, inclusive activities, holiday camp, team building activities, music and dance, cultural festivals and theme parks
- Organisations providing products and services in the Leisure and Recreation industry
  - Non-Commercial: Government (Public sector), NGOs (Voluntary sector)
  - Commercial (Private sector): Natural and built attractions, shopping facilities, craft markets, performing arts centres, sports complexes, amusement parks, theme parks and concerts
- Individual needs for leisure and recreation activities, e.g., age group, gender, special needs, families with children, and special interests
- Impacts of Leisure and Recreation on the economy, society, culture, and environment
- Opportunities and challenges faced by Leisure and Recreation providers

The students will have the opportunity to develop the following attitudes and dispositions:

- Determination to learn independently.
- Collaborative and interpersonal skills.
- Sense of curiosity.
- Visual thinking through field trips.
- Foster critical thinking through debates.

2.0: Develop an understanding of the operation of the Leisure and Recreation industry

What the students will be able to do:

2.1 List the resources required for any three Leisure and Recreation activities.

2.2 Explain the main safety protocols for conducting these Leisure and Recreation activities.

2.3 Explain the importance of logistics planning in the execution of any three Leisure and Recreation activities.

2.4 Identify sustainable practice considerations in the Leisure and Recreation industry.

How the students may apply their knowledge and skills:

Students may apply their knowledge and skills by:

- Researching into the human, physical, and financial resources required for different types of Leisure and Recreation activities, for example, Sports and Recreation, Performing Arts, Cultural and Heritage, Outdoor and Nature, Culinary and Food Experiences, Travel and Tourism, Social and Community.
- Discussing the safety and security regulations, and procedures specific to a chosen Leisure or Recreation activity (Class Discussion and Seminars/Guest Speakers).
- Participating in at least one Leisure and Recreation activity, for example in sports-related, culture-related or in performing arts to demonstrate an understanding of relevant safety protocols (physical or virtual visit).
- Demonstrating an understanding of coordination, timelines, and itineraries by creating a simple Leisure and Recreation activity (pair work).
- Analysing simple case studies to identify the key logistics issues and propose solutions for improvement (Think-pair-share).
- Preparing supporting materials as part of logistics for conducting Leisure and Recreation activities (individual/pair work).
- Researching on sustainable practices for Leisure and Recreation activities (group work).

Content and Range

- Resources for organizing and executing various Leisure and Recreation activities for example, human resources (staff, volunteers), physical resources (equipment, venues, costumes, decorations), and financial resources (budgets, funding sources)
- Rules, regulations, and safety protocols specific to diverse Leisure and Recreation activities
- Logistics planning for Leisure and Recreation activities (venue selection, transportation coordination, catering, activity scheduling, timeline creation, and itinerary development)
- Supporting materials preparation as part of logistics for conducting activities (individual/pair work):
    - Types of music and forms of dance for the Leisure and Recreation activities
    - Simple costumes for Leisure and Recreation activities
    - Face painting and make-up techniques for performances
    - Simple decorative crafts and décors
- Sustainable practices within the Leisure and Recreation industry (e.g., eco-friendly materials, energy-saving methods, recycling bins, and waste reduction strategies)

The students will have the opportunity to develop the following attitudes and dispositions:

- Foster creativity
- Critical thinking and problem-solving through analysis of case studies and field trips
- Fostering attention to detail and thoroughness
- Promoting adaptability
- Sense of curiosity to explore the concept of sustainability
- Interpersonal and collaborative skills through group work
- Ethical behaviour
- Contributing actively to the promotion of sustainability personally and in communities

3.0: Organise a Leisure and Recreation activity

What the students will be able to do:

3.1 Identify three possible Leisure and Recreation activities to be organised.

3.2 Prepare a brief feasibility study for each activity.

3.3 Select the most appropriate activity for implementation.

3.4 Plan a budget for the implementation of the activity.

3.5 Prepare a basic risk assessment and contingency plan.

3.6 Use effective marketing strategies and tools to attract the intended participants.

3.7 Carry out a Leisure and Recreation activity.

3.8 Evaluate the outcome of the activity.

How the students may apply their knowledge and skills:

Students may apply their knowledge and skills by:

- Researching at least three creative Leisure and Recreation indoor/outdoor activities for example, game, sports, dance, music (individual/group).
- Carrying out a feasibility study and selecting an appropriate activity based on the needs of the target audience (problem-based learning approach).
- Creating a budget spreadsheet to manage funds.
- Creating simple marketing materials (posters, leaflets, social media posts and promotional short videos).
- Carrying a risk assessment for the chosen activity and proposing actions required to control the risks.
- Role-playing on scenarios for decision-making and event organisation skills.
- Implementing a creative Leisure and Recreation activity with supporting documentation and processes including: checklist, venue setup and preparation, safety and security, timeline and schedule.
- Collecting feedback from the target audience to identify strengths and weaknesses of the activity.
- Proposing recommendations through group discussion to enhance future activity planning based on the feedback.

Content and Range

- Activity Planning: Research and Goal Setting, Venue Selection, Budgeting, Programme, Resource Allocation
- Marketing: Marketing Mix 4Ps – Price, Place, Product and Promotion
- Risk Assessment and Contingency Planning
- Feedback and Evaluation: Types of feedback (Pre, In event, Post)

The students will have the opportunity to develop the following attitudes and dispositions:

- Foster creativity
- Appreciate activities that complement and promote the Leisure and Recreation industry
- Conform to rules during activities
- Collaborate with professionals, organisations, and associations in the planning of activities
- Adopt a positive attitude to emergency response protocols
- Communicate ideas clearly
- Respect and collaborate with team members and other stakeholders
- Embrace challenges
- Develop receptiveness to feedback
- Self-assessment of own work.

4.0: Outline the career opportunities and competencies required in the Leisure and Recreation industry.

What the students will be able to do:

4.1 Identify four possible career options in the Leisure and Recreation industry.

4.2 List the main skills and competencies required for each.

4.3 State the standards for personal presentation for jobs in the industry.

4.4 Outline the importance of delivering good customer service.

4.5 Illustrate opportunities and challenges of working in the Leisure and Recreation industry.

How the students may apply their knowledge and skills:

Students may apply their knowledge and skills by:

- Brainstorming the possible career opportunities in the Leisure and Recreation industry (teacher-led activity followed by group-based research).
- Undertaking field trips to observe different skills and standards for personal presentation (in groups).
- Participating in role-play scenarios using diverse customer service delivery situations (group work).
- Assisting with career guidance events and talks by targeted professionals to discuss about opportunities and challenges.

Content and Range

- Career opportunities (Recreation coordinator, tour guide, event planner, hospitality manager, sports coach, marketing specialist)
- Skills and competencies for the Leisure and Recreation industry, e.g., communication skills, teamwork, interpersonal skills, strong values and work ethics, problem-solving skills, speaking foreign languages, time-management skills, organisation skills and teamwork
- Importance of personal presentation and professional image: dress code, hygiene, self-image, body language
- The importance of good customer care and service delivery for leisure and recreation providers
- Opportunities and challenges of working in the Leisure and Recreation industry

The students will have the opportunity to develop the following attitudes and dispositions:

- Awareness of ways to deliver quality customer service.
- Personal, professional and skills development.
- Sense of being part of a team.
- Reflection on own interests and goals with respect to career choices.
- Embracing opportunities and facing challenges.

Mode of Assessment

50%	50%
1 portfolio continuously built and assessed throughout the programme	Written Examination

COMPUTER SYSTEMS AND MAINTENANCE

Subject: Computer Systems and Maintenance

Subject outline:

Computer systems are used in a wide range of applications, including business operations, scientific research, entertainment and communications. They have revolutionised many aspects of society, enabling increased efficiency, automation and access to information. Maintenance refers to the regular activities and procedures carried out to ensure the smooth operation and reliability of computer systems. These activities encompass hardware and software components and involve preventive measures as well as troubleshooting and repairs. Studying computer systems and maintenance provides numerous benefits, including expanded career opportunities in the world of work and empowerment in the face of technology challenges.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Build a computer system based on a specification.
2.0 Explain the different types of software.
3.0 Describe the functions of the components in a Central Processing Unit (CPU).
4.0 Perform maintenance and troubleshooting tasks.
5.0 Use cloud storage to store and retrieve data.
6.0 Create artefacts using 3D printers.
7.0 Build IoT (Internet of Things) and automated systems.

1.0: Build a computer system based on a specification
What the students will be able to do:
1.1 Describe what is computer hardware. 1.2 Explain the purpose of different hardware components. 1.3 Select hardware specifications for a computer system. 1.4 Connect hardware components using appropriate interfaces.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: - Completing hands-on activities to connect hardware components.
Content and Range
• Internal hardware components (processor, memory, and storage devices) • Peripheral Devices • Hardware specification • Secondary storage (flash drives, hard disks, Solid State Drives) • I/O Ports • Motherboard, Ports (USB, HDMI) • Graphics Processing Unit, Sound Card • Network Interfaces (Wired, Wireless).

The students will have the opportunity to develop the following attitudes and dispositions:

- Choose hardware devices for a provided set of requirements.
- Justify the need for additional hardware devices in a computer system.

2.0: Explain the purpose of different types of software

What the students will be able to do:

2.1 Describe what is meant by software.
2.2 Explain the difference between system software and application software.
2.3 Explain the functions of an operating system.
2.4 Choose appropriate operating system for specific devices.
2.5 Describe the importance of device drivers and utility software.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Selecting and installing appropriate software for a given hardware specification (Section 1.0).
- Performing basic operations using different types of software in groups (Guided installation of OS and Application Software).

Content and Range

- System software and application software
- Operating system (Windows, Linux, MacOs, Android)
- Types of Operating systems
- Features of different operating systems
- Device Drivers and Utility Software

The students will have the opportunity to develop the following attitudes and dispositions:

- Justify the choice of an operating system for a given situation.
- Recognise the importance of system software updates for system performance.
- Ability to communicate ideas effectively in groups.

3.0: Describe the functions of the components in a Central Processing Unit (CPU)

What the students will be able to do:

3.1 Describe the Von-Neumann Architecture.
3.2 Explain the role of registers in a CPU.
3.3 Describe the data bus, address bus and control bus.
3.4 Describe the process of the fetch-decode-execute cycle.
3.5 List factors that affect the performance of a computer system.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Using simulation software online to visualise the fetch-decode-execute cycle. https://tools.withcode.uk/cpu/

Content and Range

- Von Neumann Architecture
- General and special purpose registers
- Arithmetic Logic Unit, Immediate Access Store
- Buses (Address, Control and Data)
- Stages of fetch-decode-execute cycle
- Performance of a computer system

The students will have the opportunity to develop the following attitudes and dispositions:

- Reflecting on CPU design factors that affect the performance of a computer.

4.0: Perform maintenance and troubleshooting tasks

What the students will be able to do:

4.1 Configure a computer system.
4.2 Use troubleshooting techniques to address hardware and software failure.
4.3 Use software tools to perform maintenance tasks on a computer system.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Group activity to configure a computer system for a given scenario.
- Group activity on how to perform maintenance and troubleshooting tasks.

Content and Range

- Computer system configuration
- Troubleshooting common problems related to Motherboard, RAM, CPU, Power, and I/O devices.
- Troubleshooting software failure (OS and application software)
- Computer Maintenance tasks
- Precautions when performing maintenance and troubleshooting

The students will have the opportunity to develop the following attitudes and dispositions:

- Appreciate the importance of maintenance and troubleshooting for the smooth running of a computer system.
- Show an awareness of safety measures to be adopted when performing maintenance and troubleshooting.
- Ability to perform maintenance tasks in collaboration with peers.

5.0: Use cloud storage to store and retrieve data

What the students will be able to do:

5.1 Describe cloud storage.
5.2 Identify different cloud storage platforms.
5.3 Explain advantages and disadvantages of using cloud storage.
5.4 Describe features of cloud storage platforms.
5.5 State potential security concerns when using cloud storage.

How the students may apply their knowledge and skills:

The students will apply the knowledge and skills through:

- Creation of an account to use cloud storage platform to store data for a given scenario.
- Activities to perform basic operations on a cloud platform (upload and download).
- Talks by a professional on privacy issues related to the use of cloud storage.

Content and Range

- Cloud storage platforms
- Physical servers used for cloud storage
- Advantages and disadvantages of cloud storage
- Security threats associated with the use of cloud storage

The students will have the opportunity to develop the following attitudes and dispositions:

- Reflect on potential security concerns when using cloud storage.
- Justify the choice of an appropriate cloud storage platform.
- Develop confidence to engage with professionals from the industry.

6.0: Create artefacts using Three Dimensional (3D) printers

What the students will be able to do:

6.1 Describe the characteristics and purpose of a 3D printer.
6.2 Identify different types of 3D printer.
6.3 Connect a 3D printer to a computer system.
6.4 Design 3D models using appropriate software.
6.5 Make use of a 3D printer to create a 3D object.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Activities based on the use of Computer Aided Design (CAD) / Computer Aided Manufacturing software to design a 3D model.
- Setting up a 3D printer to create a 3D object.
- Exploring the use of 3D printed objects in different industries
- Field trips to 3D printing centre
- Workshops by professionals in the field of 3D printing

Content and Range

- Principles of operation for a 3D printer
- Types of 3D printer
- Filaments
- CAD/CAM software
- Using a 3D printer

The students will have the opportunity to develop the following attitudes and dispositions:

- Justify the choice of a 3D printer for a given application.
- Explore the importance of 3D printed models in different industries.

7.0: Build Internet of Things (IoT) and automated systems

What the students will be able to do:

7.1 Describe the components of an IoT ecosystem.
7.2 Identify types of IoT systems.
7.3 Describe the purpose of different types of sensors and actuators.
7.4 Describe the characteristics and purpose of an embedded system.
7.5 Create automated systems using sensors, microcontrollers and actuators.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Project based learning and hands-on activities on IoT and automated system.
- Task on how to program a microcontroller (Arduino Kit).
- Presentation on sensors and actuators in simulation tools.
- Field trip to an industry using IoT/Automated Systems.
- Group project to design and build a simple IOT/automated system.

Content and Range

- Sensors and actuators
- Microcontroller (Arduino Kit)
- IoT gateway
- Simulation tools (Tinkercad, Wokwi)
- Electronic components
- Use of breadboard
- Simple circuit design

The students will have the opportunity to develop the following attitudes and dispositions:

- Laying the foundation knowledge of automated system using IoT.
- Explore the importance of IoT and automated systems in real world applications.
- Show initiatives to work on project based-learning (PBL) activities related to real world.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

COMMUNICATION TECHNOLOGIES

Subject: Communication Technologies

Subject outline:

Communication technologies are the tools and systems that enable people to exchange information across different locations. They are constantly evolving and improving, offering new features and capabilities that promote communication, collaboration and learning. This subject focuses on developing knowledge and skills in relation to computer networks, data transmission, the internet and emerging technologies, and cybersecurity.

Guided Learning Hours: 5 periods per week

Core subject competencies:

1.0 Explain the fundamentals of the internet and emerging technologies.

2.0 Apply main concepts and principles of data transmission and methods of error detection

3.0 Design a basic computer network

4.0 Explore the fundamentals of cybersecurity

5.0 Apply strategies to manage digital footprints and protect online information

1.0: Explain the fundamentals of the internet and emerging technologies.
What the students will be able to do:
1.1 Describe the Internet and its services. 1.2 Recognise the impact of the Internet on society. 1.3 Identify emerging technologies in information technology fields. 1.4 Explain how emerging technologies function.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: - Creation of an infographic on the following: (1) The benefits and challenges of the internet on society. (2) The impact of emerging technologies on society. - Demonstration on Augmented Reality, Virtual Reality using special equipment and software. - Students deliver an interactive poster presentation on Blockchain technologies. - Industry talks on emerging technologies. - Internet of Things (IoT) applications in our daily life.

Content and Range

- Brief description of the Internet and its components
- Benefits of the Internet
- Uses of the internet
- Internet Service Provider
- Use of the internet in different fields
- Threats on the Internet
- Emerging technologies (digital currency, block chain, Artificial Intelligence, chatbot, Internet of Things, Augmented Reality, Virtual Reality and Mixed Reality)
- Benefits and challenges of emerging technologies
- Talks by experts from the Industry (Emerging Technologies).

The students will have the opportunity to develop the following attitudes and dispositions:

- Show confidence to engage with professionals from the Industry.
- Ability to develop communication skills for elaborating on emerging technologies.

2.0 Apply main concepts and principles of data transmission and methods of error detection

What the students will be able to do:

2.1 Describe transmission media (wired and wireless).
2.2 Explain the concepts and principles of data transmission.
2.3 Understand the transmission of information using packets.
2.4 Describe methods for error detection.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Simulators used for error detection techniques.
- Expert Talks on data transmission (ISP, Broadcasting, Radio Amateurs, and communication field).
- Site visits to studios used for broadcasting.
- Talks by regulatory body ICTA (Information and Communication Technology Authority).
- Case based scenarios (how data is transmitted) – collaborative task.

Content and Range

- Concepts and principles of data transmission (addressing, payload, size, bandwidth)
- Methods of error detection (parity, cyclic redundancy check)

The students will have the opportunity to develop the following attitudes and dispositions:

- Ability to communicate ideas effectively in groups.
- Ability to develop problem-solving skills for data transmission.

3.0 Design a basic computer network

What the students will be able to do:

3.1 Describe the concepts of computer networking.
3.2 Identify networking hardware.
3.3 Compare different types of networks.
3.4 Select appropriate networking topologies for different requirements.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Presentation on the how to set up computer networks for a given situation (Example: setting up and extending a home network).
- Collaborative learning (students to work in groups or pairs to solve network-related problems. This promotes teamwork, critical thinking, and problem-solving skills. It also allows students to learn from each other's experiences and perspectives).
- Invite professionals working in the field of computer networks to share their experiences and insights with the students.

Content and Range

- Computer networks
- Network topologies
- Network hardware
- Internet Protocols (IP)

The students will have the opportunity to develop the following attitudes and dispositions:

- Ability to develop problem-solving skills in computer networking.
- Ability to develop interpersonal skills.

4.0 Describe the concepts of cybersecurity

What the students will be able to do:

4.1 Explain the importance of cybersecurity
4.2 Define different levels of access controls
4.3 Describe types of attacks and protection mechanisms
4.4 Develop responsible online behaviours

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Use of scenario-based assessment where students will have to identify surface of attack and types of attack.
- Poster Presentation on security recommendations and online good practices.
- Industry talks on the topic on cybersecurity (issues and practices).
- Collaborative discussion on adopting the best practices for given cybersecurity threats.

Content and Range

- Cybersecurity (confidentiality, integrity and availability)
- Access controls (Authentication, authorization and accountability)
- Types of attacks
- Security counter measures
- Data Security
- Dos and Don'ts of Online Behaviour

The students will have the opportunity to develop the following attitudes and dispositions:

- Ability to develop confidence in engaging with professionals from the Industry.
- Ability to prepare questions to ask the professionals from the industry.

5.0: Understanding digital footprints and online presence

What the students will be able to do:

5.1 Describe digital identity and a digital footprint.

5.2 Identify factors that influence digital identity and footprint associated with online activities.

5.3 Define sensible and ethical online good practices.

5.4 Describe methods to protect digital identities.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Scenario-based learning activities
  - Example 1: Students are presented with an entity with an online presence, e.g. a retail commercial company. The assessments will involve identifying digital identities, describing good practices associated with these digital identities, and providing recommendations.
  - Example 2: Students are given an activity where they are being screened by a potential recruiter. They will be involved in working with their own digital identities and apply the best practices.
  - Example 3: Students are tasked with the identification of digital footprints and the implications of these footprints in given scenarios.

- Project-based activities
  - Students will participate in group discussions about the Do's and Don'ts of digital identities.
  - Industry talks by professionals.

Content and Range

- Digital identities
- Digital footprints
- Legal and ethical considerations
- Do's and Don'ts associated with digital identities
- Sensible behaviours (prevention of cyber bullying, hate speech and online abuse)

The students will have the opportunity to develop the following attitudes and dispositions:

- Ability to adopt best practices for maintaining a positive digital identity.
- Ability to protect confidential information (digital identity).

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

FUNDAMENTALS OF PROGRAMMING

Subject: Fundamentals of Programming

Subject outline:

Computational thinking, algorithms, problem-solving and software development are key pillars of computer programming. This subject enables students to develop a systematic and logical approach to problem-solving and to foster critical thinking skills. Algorithms and problem-solving techniques provide students with the ability to break down complex problems and develop solutions. The subject covers software development and introduces students to programming languages and web development to design, build and deploy software applications.

Core subject competencies:

1.0 Use computational thinking skills to develop solutions to problems.

2.0 Explore the main principles of problem-solving using computer systems.

3.0 Write and amend algorithms for solving problems.

4.0 Explain the Program Development Life Cycle (PDLC).

5.0 Design and develop software applications using programming languages and tools.

6.0 Design and develop a visually appealing website.

1.0: Use computational thinking skills to develop solutions to problems
What the students will be able to do:
1.1 Describe decomposition and its application in the computational thinking process. 1.2 Identify pattern recognition and its application in the computational thinking process. 1.3 Explain abstraction and its application in the computational thinking process. 1.4 Make use of algorithms and their application in the computational thinking process.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: • Group work to break down complex problems into smaller manageable parts by using the computational thinking process. • Problem-based learning by representing an idea or a process to solve problems.
Content and Range
• Computational thinking • Decomposition, pattern recognition and abstraction • Algorithm design
The students will have the opportunity to develop the following attitudes and dispositions:
• Reflect on the importance of the computational thinking technique in different scenarios. • Develop good collaborative skills to solve problems.

2.0: Explore the main principles of problem-solving using computer systems

What the students will be able to do:

2.1 Identify the fundamentals of computer programming.

2.2 Explain the purpose of an algorithm in computer programming.

2.3 Explain the processes involved in creating an algorithm in computer programming.

2.4 Explain the need for validation checks to be made on data and the different types of validation checks.

2.5 Identify that every computer system is made up of sub-systems, which are made up of further sub-systems.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Using logic to examine a situation and/or problem to propose an appropriate solution.
- Working in groups to use different methods to show the solution to a problem.
- Creating a presentation to showcase the practical use of algorithms in everyday situations.
- Supporting research on programming concepts and algorithms.
- Activity-based learning to apply the three constructs, namely selection, sequence and iteration in writing algorithms.

Content and Range

- Problem solving using computers
- Different methods to design and construct a solution to a problem
- Conditional and repeating structures
- Variables, constants, expressions, and assignment statements
- Arithmetic, logical and Boolean operators

The students will have the opportunity to develop the following attitudes and dispositions:

- Develop the ability to think algorithmically, including problem-solving strategies, creating step-by-step procedures and optimising algorithms.
- Communicate ideas effectively.
- Develop interpersonal skills.

3.0: Write and amend algorithms for solving problems

What the students will be able to do:

3.1 Recognise various types of data.

3.2 Explain the tools used to represent an algorithm.

3.3 Detect errors in given algorithms.

3.4 Identify the relationships and dependencies between modules in the structure diagram.

3.5 Make use of the appropriate symbols and conventions in flowchart design.

3.6 Identify the purpose and main features of pseudocode.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Completion of a trace table to manually work through an algorithm and record values of variables.
- Problem-based learning to use structure diagrams to design and construct a solution to a problem.
- The drawing a flowchart that represents logical flow of an algorithm or program.
- Activity-based learning to write pseudocode to construct solutions.

Content and Range
• Algorithms • Structure diagrams • Flowcharts • Pseudocodes
The students will have the opportunity to develop the following attitudes and dispositions:
• Adopt a systematic approach to problem-solving. • Develop social skills.

4.0: Explain the Program Development Life Cycle (PDLC)
What the students will be able to do:
4.1 Identify the different software processes in software development 4.2 Describe the basic process activities of analysis, design, coding, testing and maintenance 4.3 Explain how the PDLC ensures delivery of high-quality systems and maximises productivity.
How the students may apply their knowledge and skills:
Students will apply the knowledge and skills through: • Guided research on the PDLC stages to plan and complete software development tasks systematically. • Group work to define the requirements and prototypes for a new system based on a given scenario. • Talks by targeted professionals on the software development methodologies.
Content and Range

• PDLC
• Stages of PDLC
  ○ Analysis
  ○ Design
  ○ Coding
  ○ Testing
  ○ Maintenance

The students will have the opportunity to develop the following attitudes and dispositions:
• Show initiatives to work independently on guided research activities. • Prepare questions to ask professionals. • Demonstrate confidence in engaging with professionals. • Develop the ability to take appropriate notes.

5.0: Design and develop software applications using programming languages and tools
What the students will be able to do:
5.1 Identify the purpose of programming blocks. 5.2 Define the concepts of sprites, costumes, and backdrops in creating interactive projects. 5.3 Use the steps involved in the problem-solving process to implement a solution in Scratch. 5.4 Explain the concept of variables, data types for single data items and collections of data, and operators in Python programming. 5.5 Examine the use of control structures, conditionals, and loops in programming. 5.6 Use the principles of computational thinking, namely problem decomposition, pattern recognition, and abstraction, in the context of Python programming. 5.7 Identify the main components of MIT App Inventor 5.8 Use the concept of events and event handlers in mobile app development.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Activity-based learning to design and build software applications using Scratch programming language.
- Problem-based learning to write Python programs to solve computational problems.
- Peer and educator feedback to design user-friendly interfaces for mobile apps.
- Real-world problem-solving to implement functionality and interactivity in mobile apps using MIT App Inventor.

Content and Range

- Scratch
- Python
- MIT App

The students will have the opportunity to develop the following attitudes and dispositions:

- Develop persistence in tackling complex programming problems and finding solutions.
- Experiment with novel approaches and techniques to solve programming challenges.
- Pay close attention to syntax, code structure, and logical flow, ensuring high-quality programming outcomes.
- Foster a cooperative mind set by actively engaging in group discussions and sharing ideas.
- Emphasise the importance of proper code documentation, naming conventions, and adherence to coding standards.

6.0: Design and develop a visually appealing website

What the students will be able to do:

6.1 Explain the basic concepts and syntax of HTML, CSS and JavaScript.
6.2 Identify the purpose and usage of popular web development frameworks.
6.3 Explain the importance of colour theory and its application in web design.
6.4 Use the principles of UI design in a software project.

How the students may apply their knowledge and skills:

Students will apply the knowledge and skills through:

- Visits to computer workplaces involved in web development.
- Activity-based learning to design website layouts using appropriate UI design principles and techniques.
- Real-life scenarios to develop a website using HTML, CSS and JavaScript.

Content and Range

- Web development frameworks
- HTML
- CSS
- JavaScript
- Colour theory
- Principles of User Interface design

The students will have the opportunity to develop the following attitudes and dispositions:

- Demonstrate a willingness to explore new technologies and adapting to evolving web development practices.
- Foster creativity in designing and developing a website.

Mode of Assessment

50% 1 portfolio continuously built and assessed throughout the programme	**50%** Written Examination

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