



NATIONAL CERTIFICATE IN PLUMBING (NCPL)



**SYLLABUS
FOR
TECHNICAL AND VOCATIONAL INSTITUTES**

THE REPUBLIC OF UGANDA
Ministry of Education Science Technology & Sports



Copyright

© National Curriculum Development Centre, Uganda, 2016

Published by
National Curriculum Development Centre, 2016
P.O. Box 7002
Kampala

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted in any form or by any means - electronic, mechanical, photocopying, recording or otherwise - without the prior written permission of the publisher.

Website: www.ncdc.go.ug

ISBN:

Table of Contents

<i>Contents</i>	ii
<i>Acknowledgement</i>	v
<i>Foreword</i>	vi
<i>List of Acronyms</i>	vii
<i>Introduction</i>	10
Guidelines for Implementing the NCPL Curriculum	11
Final Examinations Paper Format.....	18
Course Structure	33
<i>Detailed Module Description of Year 1 Term 1</i>	34
TCTM 101: Applied Technician Mathematics I	34
TCCS 101: Life skills.....	36
TCCA 101: Computer Applications	38
NCPL 101: Plumbing Technology I	40
TCPL 102: Plumbing Science I	43
TCPL 103: Workshop Practice I	45
TCPL 104: Drawing	47
TCPL 105: Real Life Project I.....	49
<i>Detailed Module Description of Year 1 Term 2</i>	51
TCTM 101: Applied Technician Mathematics I	51
TCCS 101: life skills	53
TCCA 101: Computer Applications	55
TCPL 101: Plumbing Technology I.....	57
TCPL 102: Plumbing Science I	59
TCPL 103: Workshop Practice I	60
TCPL 104: Drawing	62

TCPL 105: Real Life Project I.....	64
<i>Detailed Module Description of Year 1 Term 3.....</i>	<i>66</i>
TCTM 101: Applied Technician Mathematics I.....	66
TCCS 101: Life skills	66
TCPL 101: Computer Applications.....	69
TCPL 101: Plumbing Technology I.....	71
TCPL 102: Plumbing Science I	73
TCPL 103: Workshop Practice I	74
TCPL 104: Drawing	76
TCPL 105: Real Life Project I.....	78
NCPL 106: Industrial Training 1	79
<i>Detailed Module Description of Year 2 Term 1.....</i>	<i>81</i>
TCTM 201: Applied Technician Mathematics II.....	81
TCBE 201: Entrepreneurship Skills.....	82
TCCS 201: Basic Kiswahili	84
TCPL 201: Plumbing Technology II	85
NCPL 202: Plumbing Science II	86
TCPL 203: Workshop Practice II.....	87
TCPL 205: Real Life Project II	88
<i>Detailed Module Description of Year 2 Term 2.....</i>	<i>90</i>
TCTM 201: Applied Technician Mathematics II.....	90
TCBE 201: Entrepreneurship Skills.....	92
TCCS 201: Basic Kiswahili	94
TCPL 201: Plumbing Technology II	95
TCPL 202: Plumbing Science II.....	97
TCPL 203: Workshop Practice II.....	99

TCPL 205: Real Life Project II.....	100
<i>Detailed Module Description of Year 2 Term 3.....</i>	<i>102</i>
TCTM 202: Applied Technician Mathematics II.....	102
TCBE 201: Entrepreneurship Skills.....	104
TCCS 201: Basic Kiswahili	106
TCPL 201: Plumbing Technology II	107
TCPL 202: Plumbing Science II.....	109
TCPL 203: Workshop Practice II.....	111
TCPL 205: Real Life Project II	112
NCPL 206: Industrial Training.....	114
<i>Appendices.....</i>	Error! Bookmark not defined.
Appendix 1: Industrial Training Guidelines	Error! Bookmark not defined.
Appendix 2: Industrial Training Assessment Form for Field or Onsite Supervisor	Error! Bookmark not defined.
Appendix 3: Industrial Training Assessment Form for Academic Supervisor.....	Error! Bookmark not defined.
Appendix 4: Field Attachment Report and Guide for Industrial Training.....	Error! Bookmark not defined.
<i>Bibliography</i>	<i>123</i>

Acknowledgement

National Curriculum Development Centre (NCDC) extends its appreciation to all panel members and institutions that participated in developing this Syllabus.

NCDC also recognises the historic contributions of City and Guilds of London Institute, East African Examinations Council and Uganda National Examinations Board (UNEB) for providing the foundation on which technical education in Uganda is built.

Great thanks go to the Directorate of Industrial Training (DIT) who provided the Professional Profile and to Uganda Business and Technical Examinations Board (UBTEB) for their contribution both in content and implementation policies.

NCDC acknowledges the following ministries and institutions: Ministry of Education, Science, Technology and Sports (MoESTS); Ministry of Works and Transport; Ministry of Labour, Gender and Social Development; Directorate of Education Standards; National Council for Higher Education; Uganda Technical and Vocational Institutes, and the world of work for providing panellists during the development of this curriculum.

Special thanks go to the MoESTS, RTI-SPEAR Project and International Labour Organisation for the financial support that enabled the development of this curriculum.

Ms Grace K. Baguma

Director

National Curriculum Development Centre

Foreword

Improvement of the curricula for Technical Certificate Courses is part of the MoESTS' Strategy (2008) for the provision of technical and vocational education. Technical and Vocational Institutes train Technicians in Uganda. The Government of Uganda aims at providing technical, scientific and vocational skills for a majority of Ugandans, in line with its emphasis on Skilling Uganda.

The development of this curriculum started with a survey of the World of Work, which included employers and graduates of technical certificate courses. A report from the survey culminated into the development of a Professional Profile, which includes all jobs and tasks that the graduates of Plumbing perform, and the development of all modules in this curriculum.

The curriculum is updated with current labour market demands and it is learner-centred and competence-based,. It focuses on core tasks and assignments. It begins with a preparatory assignment and each academic year involves execution of a real life project that makes the technician competent in the trade. It aims at making Technical and Vocational Institutions centres of excellence for technical education and skills development in the region, which will result into a greater development and industrialisation of the country.

Dr. Rose Nassali Lukwago

Permanent secretary

Ministry of Education Science Technology and Sports

List of Acronyms

ABC	Abstain, Be faithful, Use Condoms
BCC	Behaviour Change and Communication
BTVET	Business, Technical, Vocational Education and Training
CD	Curriculum Development
CGPA	Cumulative Grade Point Average
CH	Contact Hours
CTF	Curriculum Task Force
CU	Credit Units
DES	Directorate of Education Standards
DIT	Directorate of Industrial Training
ELTE	Electronic Learning and Teaching Environment
GP	Grade Point
HCF/M	Highest Common Factor/ Multiple
HCT	HIV Counselling and Testing
HDME	Higher Diploma in Mechanical Engineering
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
KES	Kyambogo Engineering Services
LCM	Lowest Common Multiple
MoESTS	Ministry of Education, Science, Technology and Sports
MoH	Ministry of Health
MoLGSD	Ministry of Labour, Gender and Social Development
NCPL	National Certificate in Plumbing
NCDC	National Curriculum Development Centre
NCHE	National Council for Higher Education
NCME	National Certificate in Mechanical Engineering
NDME	National Diploma in Mechanical Engineering
NGO	Non-Governmental Organisation

NP	Normal Progress
NVQF	National Vocational Qualification Framework
NWY	Number of Weeks per Year
PEP	Post Exposure Prophylaxis
PH	Practical Hours
PLHIV	People Living with HIV and AIDS
PP	Probationary Progress
PPDA	Public Procurement and Disposal of Assets
RTI	Research Triangle International
SACCO	Savings and Credit Co-operative
SHE	Safety Health and Environment
SJA	Safe Job Analysis
SMC	Safe Male Circumcision
SPEAR	Supporting Public Sector Workplace to Expand Actions and Responses to HIV and AIDS
STI's	Sexually Transmitted Infections
TC	Technical Certificate; module code letter identifiers for Certificate Courses
TCTM	Technical Certificate Course; module code for Applied Technicians Mathematics
TCCS	Technical Certificate Course; module code for Communication Skills
TCCA	Technical Certificate Course; module code for Computer Applications
TCBE	Technical Certificate Course; module code for Business Entrepreneurship Skills
TCHY	Total Contact Hours per Year
TCME	Technical Certificate Course; module code for Mechanical Engineering core modules

TCPL	Technical Certificate Course; module code for Plumbing core modules
TH	Training Hours
TS	Technical School
TI	Technical Institute
UBTEB	Uganda Business and Technical Examinations Board
UNAIDS	The Joint United Nations Programme on HIV and AIDS
UNEB	Uganda National Examinations Board
UTC	Uganda Technical College
VAT	Value Added Tax
VTI	Vocational Training Institute
VS	Vocational School
WoW	World of Work

Introduction

This National Certificate in Plumbing (NCPL) curriculum is aimed at producing plumbing technicians who are relevant to the industry and world of work. It is learner-centred and competence-based and emphasises acquisition of skills by the learners through practical teaching and execution of projects.

The curriculum is in line with the BTVET Act (2008), the BTVET Strategic Plan “Skilling Uganda” and the Uganda Vision 2040.

The competences that the learner is expected to acquire are clearly spelt out in the modules covered in each of the three terms of an academic year. The modules offered in this course are packaged in a manner that will enable the learner attain particular skills required for performing tasks at any level of the respective academic year of study.

Modules such as Computer Applications, Basic Kiswahili and life Skills, are aimed at enhancing the learner’s computer literacy, report writing, and life skills.

In addition, the following modules: Plumbing Technology, Plumbing Science, Workshop Practice, Drawing and Real Life Project, are aimed at equipping the learner with the core hands-on skills and techniques in the field of plumbing and water engineering.

Applied Technicians Mathematics module is aimed at improving the learner’s ability to judge, make decisions, estimate and cost materials and labour, analyse data and understand trends in the world of work.

The Entrepreneurship Skills module provides the learner with the skills of starting up, profitably managing and sustaining an enterprise in an ethical manner.

Industrial Training, which comes at the end of each academic year, is aimed at bridging the gap between institution-based training and the world of work.

This curriculum, if implemented effectively, will produce Plumbing professionals who are able to:

- i) carry out installations of appliances and water pipes.
- ii) maintain and repair water facilities and equipment.

- iii) install drainage and water disposal systems.
- iv) supervise and inspect works, upholding safety, health and environment standards.
- v) forge and make fabricated facilities, fittings and products.
- vi) start and manage an enterprise.
- vii) uphold and promote safety standards in the workplace and general public.

Guidelines for Implementing the NCPL Curriculum

Title of the Course

The title of the course is National Certificate in Plumbing (**NCPL**).

Duration of the Course

The National Certificate in Plumbing is a full time course taught in **two** academic years.

Each academic year consists of three terms. Terms One and Two consist of **12** weeks which comprise of: **10** weeks of teaching and continuous assessment and **two** weeks of practical and written examinations. Third Term consist of **10** weeks which comprise of: **eight** weeks of teaching and continuous assessment and **two** weeks of practical and written examinations.

Industrial Training is a core module carried out at the end of each academic year and lasts for **at least 6** weeks .

The course shall be completed within a timeframe of **five** years from the time of enrolment and registration.

Entry Requirements

A candidate shall be eligible for admission to the National Certificate in Plumbing course on meeting any of the following minimum qualifications:

a) Ordinary Level Entry Scheme (Uganda Certificate of Education)

The candidate should be a holder of Uganda Certificate of Education without restrictions on passes and the year of sitting **OR** its equivalent.

b) Certificate Entry Scheme

One should be a holder of Uganda Junior Technical Certificate (UJTC), Community Polytechnic Certificate (CPC) or National Junior Vocational Certificate (NJVC) from a recognised institution or its equivalent in technical/ vocational education.

Prospects for National Certificate in Plumbing

NCPL graduates may opt to further their skills and education by offering a diploma and eventually a degree in any of the following areas :

- i) National Diploma in Water Engineering
- ii) National Diploma in Civil Engineering
- iii) National Diploma in Architecture
- iv) National Diploma in Mechanical Engineering
- v) National Diploma in Information and Communication Technology
- vi) Any other related programme

Awards

- A learner who completes the course with at least 2.0 Cumulative Grade Point Average (CGPA) shall be awarded a **classified "National Certificate in Plumbing"** by the mandated examining body.
- A learner who does not attain at least 2.0 GPA but acquires competences in some modules of the course shall be awarded a **'Competency class Certificate' in Plumbing** by the mandated examining body. The competency class certificate shall allow specialised upgrading and employment since the learner attained some useful competences and skills required in a specialized field and the world of work.
- A candidate shall be considered to have acquired a competence on performing tasks required in the labour market and must have attended at **least 75%** of the course and undergone both continuous assessment and end of academic year examinations.

- A candidate will not be considered to have acquired a competence on failure to perform tasks required in the labour market. A candidate who does not attend at **least 75%** of the course, undergo continuous assessment and sit end of academic year examinations, shall NOT be awarded a competence certificate.
- Continuous assessment shall be handled by training institutions and verified by the mandated examining body.
- A learner is entitled to a statement of results by the mandated examining body indicating the grades obtained in each module irrespective of the performance.

Course Assessment

Coursework and Examination

An authorised Examinations Body will assess the NCPL; and the following guidelines shall apply:

i) Real Life Project

The real life project shall be assessed out of 100%. It shall consist of continuous assessment marks only awarded to learners during practical sessions by the teacher. The real life project shall be executed on practicum sites which may be within or outside the institution, at the institutional workshop, garages, and industries or in any other suitable location. The real life assessment shall be based on both the final product and the process involved in making it.

An authorised Examinations Board shall only verify the authenticity of the awarded marks from the completed projects on the ground and learners' participation through presentations. The total duration of the project assessment shall be **28 weeks** of teaching and continuous assessment in an academic year.

Real life Project shall be assessed out of 100 marks as follows:

- | | |
|-----------------------|----------|
| • Design | 20 marks |
| • Drawing | 10 marks |
| • Bills of quantities | 10 marks |

• Actual Implementation	25 marks
• Finishing and branding	20 marks
• <u>Final report on project and Presentation</u>	<u>15 marks</u>
<u>Total</u>	<u>100 marks</u>

(i) Other modules apart from real life project will be assessed out of 100 marks as follows:

• Continuous Assessment	40%
• Final Examination	60%

Continuous assessment shall consist of:

- **Laboratory/practical work**
- **Tests**
- **Assignments consisting of:**
 - Class work
 - Written questions to be answered from home(Home work)
 - Reports from attended industrial visits, documentaries, Field visits and presentations by professionals
 - Practical execution and participation

Modules without practical work such as; TCTM 101 Applied Technicians Mathematics I and TCTM 201: Applied Technicians Mathematics II, will have continuous assessment as follows;

• Assignments	25 marks (home work /class work)
• Tests	15 marks
Total	40 marks

Modules with practical work such as life Skills TCCS 101, Basic Kiswahili TCCS 201, Computer applications TCCA 101, Entrepreneurship Skills TCBE 201, Motor Vehicle Technology and Maintenance I TCAM 101, Motor Vehicle Technology and Maintenance II TCAM 201, Motor Vehicle Electric and Electronic Practice ITCAM 102, Motor Vehicle Electric and Electronics Practice ITCAM 202, Technician Science I TCAM103,

Technician Science II TCAM 203, Technical Drawing ITCAM 104 and Technical Drawing IITCAM 204 will have continuous assessment.

• Assignments	10 marks
• Tests	05 marks
• Practical work	25 marks
Total	40 marks

For continuous assessment, a learner shall undertake a minimum of **four** assignments comprising of **two** tests and **four** practical exercises per module.

Final Examination

Depending on the respective module examination paper format for each, the questioning techniques to be applied, should seek for the candidate's ability to remember, comprehend, apply, analyse, synthesise and evaluate conditions. All questions should be guiding the learner to perform the tasks expected of him/her in the world of work .

Industrial Training

All institutional administrators, instructors/teachers and learners should endeavour to identify placements for industrial training. A placement in this case is any place where technology, hands on skills and knowledge are being applied to produce items or provide services. This may include a workshop, a construction site, small or large manufacturing enterprises, a corporate organisation, a shop, a supermarket, a media house, a hotel, a lodge, a restaurant, a salon, a hospital etc.

The Industrial training assessment shall be conducted as follows:

- i) An industrial supervisor who will award 50% of the marks. This is because he/she is in contact with the learner and gives all the necessary practical teaching, support, guidance, correction, instruction and observation.
- ii) An academic supervisor shall visit the industry on appointment and award 30% of the marks.

- iii) A written industrial training report shall be marked out of 20% and added to the industrial and academic supervisors marks to make 100%.

The industrial training assessment forms for both industrial and academic supervisors are attached in the appendices, ii and iii.

The mandated examinations body shall also verify the authenticity of the industrial training awarded marks at the industry during the training period by sending their representatives to visit the industries where learners are placed.

Weighting System

- i) The instruction methods of a module involve classroom teaching, field visits, laboratory testing, tutorials, and practical work. Each module is weighted using the credit unit (CU). One credit unit is equivalent to 28 contact hours (CH) per academic year.
- ii) A contact hour can either be a teaching or classroom-teaching hour (LH), tutorial hour (TH), field visit and assessment hour (FVAH) and/or practical hour (PH). A contact hour is equivalent to 1 classroom teaching hour, 2 tutorial hours or 2 practical hours/field visits.
- iii) Modules are weighted according to the number of CUs they carry, which are based on their core relevancy in the trade of specialisation. Hence a module weighted 2CU would take 56 contact hours; 3 CU would take 84 contact hours and so on. A module shall contain a minimum of 2 CUs and a maximum of 5 CUs.

Grading

Each module shall be graded out of 100% according to the computed marks obtained from both the coursework and written examinations. The grade of a certificate awarded shall be according to the Cumulative Grade Point Average (CGPA) score. The final marks for a module shall be converted into Grade Point (GP) as follows:

% Marks	Letter Grade	Grade Point (GP)
80 – 100	A	5.0
75 – 79.9	B +	4.5
70 – 74.9	B	4.0
65 – 69.9	B –	3.5
60 – 64.9	C +	3.0
55 – 59.9	C	2.5
50 – 54.9	C –	2.0
45 – 49.9	D +	1.5
40 – 44.9	D	1.0
25 – 39.9	D –	0.5
00- 24.9	E	0.0

Calculation of Cumulative Grade Point Average (CGPA)

The CGPA shall be obtained by:

- i) Multiplying the grade point (GP) obtained by the credit units assigned to the module to arrive at the weighted score for the module.
- ii) Adding together the weighted scores for all modules taken up to the time.
- iii) Dividing the total weighted score by the total number of credit units taken up to the time.

Classification

The National Certificate in Plumbing shall be classified according to the CGPA obtained up to the end of the course as follows:

Class	CGPA
First class	4.40 – 5.00
Second class Upper Division	3.60 – 4.39
Second class Lower Division	2.80 – 3.59
Third Class	2.00 – 2.79

Retaking a Module

- i) A learner may retake a given module to improve grades. Retaking means repeating the entire module, that is; attending lessons, doing continuous assessments and the final examination. There will be no special examinations or tests. Should this learner get a lower grade during the retake, his/her original grade should prevail.
- ii) A learner should be allowed a maximum of three retakes for each module.
- iii) Whenever a module is retaken, the academic transcript should **not** indicate so.

Dead Year

A learner is allowed to apply for a dead year of study due to financial difficulties, sickness or other disasters and should be allowed to resume the course at the level s/he exited for the dead year. All learners applying for the dead year shall also have to complete the course within a duration of five years from the time of enrolment and registration into the course.

Academic Year Load

A learner shall carry a maximum of 30 credit units per academic year of study.

Maximum Modules per Academic Year of Study

Each academic year shall contain a maximum of **Eight** Modules including project work.

Final Examinations Paper Format

Year 1	
Paper Name and Code	Examination Format

1. Applied Technician Mathematics I (TCTM 101) 2. Life skills (TCCS 101) 3. Plumbing Technology I (TCPL 101) 4. Plumbing Science I (TCPL 102)	Each paper shall consist of eight questions and the candidate is required to answer any five. All questions carry equal marks. The questioning techniques to be applied should seek for the candidate's ability to remember, comprehend, apply, analyse, synthesise and evaluate conditions. Duration is three hours.
5. Drawing (TCPL 104)	The paper shall consist of six questions and the candidate is required to answer any four. All questions carry equal marks. The questioning techniques to be applied should seek for the candidate's ability to remember, comprehend, apply, analyse, synthesise and evaluate conditions. Duration is three hours.
6. Computer Applications (TCCA 101)	The paper shall consist of three questions carrying 50 marks each. A candidate will be required to answer any two questions. A print out of the practical outputs together with the softcopies of all files used will be sent to the assessing body. The questioning techniques to be applied should seek for the candidate's ability to comprehend, apply, analyse, synthesise and evaluate conditions. The duration of this practical examination shall be two hours.
7. Workshop Practice I (TCPL 103)	The paper shall consist of one practical section with only one question to be marked out of 100 marks. The assessing body shall send an assessing examiner to the real institutional workshop to mark the candidates as they progress with the tasks in stages until completion. The duration of this practical examination is six

	hours.
8. Real Life Project I (TCPL 105)	The real life project shall consists of continuous assessment marks. The Examinations Board should verify the authenticity of the awarded marks from the completed projects on the ground and learners' participation through presentations. The tasks to be performed should seek for the candidate's ability to, comprehend, apply, analyse, synthesise and evaluate conditions The duration of the examination is the period during the 28 weeks of teaching in an academic year of study.
Year 2	
Paper Name and Code	Examination Format
1. Applied Technician Mathematics II (TCTM 201) 2. Entrepreneurship Skills (TCBE 201) 3. Plumbing Technology II (TCPL 101) 4. Plumbing Science II (TCPL 102)	Each paper consists of eight questions and the candidate is required to answer any five. All questions carry equal marks. The questioning techniques to be applied should seek for the candidates' ability to remember, comprehend, apply, analyse, synthesise and evaluate conditions. Duration is three hours.
5. TCCS 201: Basic Kiswahili	The paper shall consist of two sections A (general Kiswahili) and B (professional). Section A shall consist of five questions and a candidate shall be required to answer any three questions. Section B shall consist of three questions and a candidate is required to answer any two . All questions carry equal

	marks. The questioning techniques to be applied should seek for the candidate's ability to remember, comprehend, apply, analyse, synthesise and evaluate conditions. The total duration of the examination shall be Three hours.
6. Workshop Practice II (TCPL 203)	The paper consists of one practical section with only one question to be marked out of 100 marks. The assessing body shall send an assessing examiner to the real institutional workshop to mark the candidates as they progress with the tasks in stages until completion. The duration of this practical examination is six hours.
7. Real Life Project II (TCPL 205)	The paper consists of continuous assessment marks. The real life project shall consist of continuous assessment marks. The Examinations Board should verify the authenticity of the awarded marks from the completed projects on the ground and learners' participation through presentations. The tasks to be performed should seek for the candidate's ability to, comprehend, apply, analyse, synthesise and evaluate conditions The duration of the examination is the period during the 28 weeks of teaching.

Focus of Education

The focus of education for NCPL emphasises the following aspects of learning:

- i) Competence-based
- ii) Real life practical assignments with supporting modules
- iii) Integrated education (knowledge, skills and positive attitude)
- iv) Innovation and initiative (learning to solve problems that one has never encountered)
- v) Upward mobility and concentric curriculum: First Year gives a picture of the later years and the profession (intensification)
- vi) Entrepreneurship and creativity oriented
- vii) Environmental, health and safety considerations
- viii) Sports, clubs and social interactions
- ix) Focus on the disabled, gender marginalised groups and equity
- x) Sustainability, professional practice, general and specialised law
- xi) Modularised programmes
- xii) Communication skills and HIV and AIDS education

Assignments (Individual/Group)

Assignments to be done by learners shall either be individual based or in groups. These will include:

- i) Real life (individual/group practical) projects
- ii) Laboratory testing of materials
- iii) Workshop practical exercises such as fitting, machining, welding and fabrication
- iv) Classroom theoretical exercises/tutorials and practical exercises
- v) Communication: oral presentation, email, and report writing
- vi) Take-home assignments to test knowledge and ability to research
- vii) Examinations and tests to gauge individual acquisition of knowledge and skills
- viii) Site and industrial visits as well as case studies
- ix) Information Communication Technology (ICT)

Role of Learners

The learner should:

- i) participate fully in class work and assignments.
- ii) be resourceful in group and personal research.
- iii) seek guidance.

- iv) learn to communicate: oral presentation, report writing and development of personal interactive skills.
- v) learn to solve problems they have never faced before (initiation and innovation).
- vi) participate in community-based real life projects.
- vii) assess the performance of staff and relevance of programmes.
- viii) serve as ambassadors of the institution to the World of Work.
- ix) learn to work independently and as part of a team.
- x) keep time and manage oneself and other people effectively.
- xi) participate in sports, social and guild activities.
- xii) participate in environment, health, safety and security awareness as well as preservation of activities.
- xiii) practice leadership roles.
- xiv) learn practical and entrepreneurship skills to enable them start up projects on their own.
- xv) maintain discipline outside the college.

Role of Teaching Staff

The teaching staff should:

- i) prepare schemes of work and lesson plans.
- ii) keep records of attendance, assessment and discipline.
- iii) serve as instructors, lecturers, supervisors and coaches.
- iv) serve as consultants/supervisors for learners' projects and assignments.
- v) assess learners' performance.
- vi) contribute to continuing innovation in education.
- vii) counsel and guide learners on career and social issues that may affect their studies.
- viii) arrange for and carry out industrial training placement and supervision.
- ix) arrange industrial tours and site visits.
- x) prepare learners for project work as well as assess and record learners' progress.
- xi) guide learners in project design and writing.
- xii) collaborate in interdisciplinary activities.
- xiii) assess effectiveness of the programmes.
- xiv) be ethical role models.
- xv) carry out research, write papers or publish technical books.

- xvi) constantly update themselves on the industry's developments and requirement standards.

Role of Non-Teaching and Support Staff

These should:

- i) ensure clean, healthy and attractive working and learning environment for learners and lecturers.
- ii) ensure timely delivery of materials and services for effective learning.
- iii) maintain ethical and moral conduct.
- iv) offer guidance and counselling to learners.
- v) manage resources.
- vi) ensure security of learners and the college and their/its property.
- vii) be flexible and able to carry out any other duties assigned to them by the supervisors.

Role of Administrative Staff

The administrative staff should:

- i) keep custody of college property (inventories).
- ii) plan for smooth running of the college (mobilise funds and human resources).
- iii) ensure equity and gender equality.
- iv) link the college with government, world of work and other stakeholders.
- v) support and facilitate learners' activities.
- vi) carry out admission of learners.
- vii) maintain and uphold the good image of the institution.
- viii) ensure high academic standards of the institution.
- ix) arrange for graduations and regular meetings of alumni.
- x) maintain ethical and moral conduct.
- xi) ensure safe and conducive learning environment.
- xii) provide learners with adequate materials.
- xiii) allow and facilitate inter-institutional activities.
- xiv) ensure co-curricular management and its implementation.
- xv) appraise staff performance.
- xvi) ensure security of learners and their property.
- xvii) ensure discipline among staff and learners.
- xviii) recommend for promotion or disciplinary action among staff.

- xix) appraise other staff.
- xx) provide regular support to teaching and learning process.

Effective Learning Environment

For successful implementation of NCPL, an effective learning environment must be provided, and this includes:

- i) Adequate physical infrastructure such as lecture rooms, laboratories, workshops and libraries equipped with relevant resources.
- ii) Electronic learning and teaching environment (ELE) such as computers, projectors, photocopiers and printers to support teaching and learning processes.
- iii) Materials such as models, audio-visual aids, books, manuals, journals and equipment that offer learners and teachers professional situations.
- iv) Adequate facilities to cater for administration and other logistical terms that adequately support the educational process.
- v) Medical facilities, proper hygiene and sanitation, proper working and studying environment, good feeding, welfare and security for the learners and staff.
- vi) Proper motivation and inspiration of staff and learners for them to commit to the Certificate courses.
- vii) Adequate arrangements for organising seminars, workshops and exhibitions, as well as sites and industrial visits.
- viii) A platform for learners and staff to air out their views such as representation on governing councils.
- ix) Professional cooks and personnel to adequately maintain all facilities such as dormitories.

Co-curricular Activities

Co-curricular activities are part of the institution activities and they enhance the teaching/learning process. Therefore the institution should ensure that:

- i) there are adequate sports and recreational facilities.
- ii) there is an effective learners' guild through which sports, recreational, religious and cultural activities are channelled and organised, and supported by the college administration without discrimination.

Professional Profile for NCPL

This section describes the professional profile of the National Certificate in Plumbing (NCPL).

Job Titles and Tasks of NCPL

The main duties and tasks performed by graduates of the National Certificate in Plumbing include the following:

Job Title	Duties / Tasks
Plumber	• Operates and performs basic maintenance of equipment and tools • Carries out domestic water supply installations • Installs drainage systems • Carries out repair and maintenance of water and sewerage systems • Performs hand forging of components • Carries out heat treatment • Performs visual tests on water and sewerage installations • Maintains records of production • Ensures safety at workplace • Inspects finished products • Estimates and costs jobs • Initiates and manages small business enterprises • Identifies materials • Operates and maintains pumps • Advises the client on the suitable materials for the job at hand • Educates the public on good hygiene practice • Upholds and promotes safety standards
Fabricator	• Initiates and manages small business enterprises • Supervises works • Estimates and costs jobs • Maintains equipment and tools • Manufactures components and products • Prepares and interprets mechanical engineering drawings • Fabricates sheet metal products • Initiates and manages small business enterprises • Manages workshop records • Tests materials used in plumbing • Leads subordinates • Prepares and carries out welding procedures

	• Upholds and promotes safety standards
--	---

Organisations that Employ (NCPL) Graduates

A graduate of NCPL may be employed in the following organisations:

- i) Manufacturing / processing industries both in the private and public sector
- ii) Service sectors like water distribution, sewerage, oil and gas, steam, engineering services/ boards, corporations and training institutions
- iii) Construction companies, Public Works Department and rural development agencies
- iv) Power generation, transmission and construction projects
- v) Self-employment in manufacturing and service sectors
- vi) Technicians in educational institutions

Core Tasks for NCPL

The core tasks are characterised as follows:

Core Task 1: To Install Appliances and Water Pipes	
Result	• Components/product
Working environment	• Workshops, industries, sites, power plants
Level of complexity	• Installation of industrial and domestic appliances /products
Performance indicators	• Client satisfaction • Compliance with safety standards • Realistic/ affordable/ economic installations • Economic growth
Methods and tools used in performing professional tasks	Tasks/Activities • Measuring, threading and cutting • Joining • Simple forming processes

	Tools and Equipment • Measuring instruments • Calculators • Drawing equipment • Testing equipment • Threading equipment • Jigs and fixtures • Hand and machine tools
--	---

Core Task 2: To Install Drainage Pipes	
Result	• Components/product
Working environment	• Workshops, industries, sites, power plants
Level of complexity	• Determination of gradient
Performance indicators	• Client satisfaction • Compliance with safety standards • Realistic / affordable/ economic designs • Economic growth
Methods and equipment used in performing professional tasks	Tasks/Activities • Use of spirit and dumpy levels • Joining • Simple forming processes Tools and Equipment • Measuring instruments • Calculators • Computers • Drawing equipment • Testing equipment • Jigs and fixtures • Hand and machine tools

Core Task 3: To Forge and Fabricate Items	
Result	• Components/product
Working environment	• Workshops, industries, sites, power plants

Level of complexity	• Forging, and heat treatment for components/products
Performance indicators	• Client satisfaction • Compliance with safety standards • Realistic / affordable/ economic designs • Economic growth
Methods and equipment used in performing professional tasks	Tasks/Activities • Machining • Joining • Heating and forming • Heat treatment Tools and Equipment • Measuring instruments • Calculators • Testing equipment • Jigs and fixtures • Hand and machine tools

Core Task 4: To Maintain Workshop Equipment and Tools	
Result	Workshop equipment and tools in good working condition
Working environment	Workshops, industries, sites, power plants
Level of complexity	Troubleshooting
Performance indicators	• Client, consultant and contractor satisfaction • Availability and reliability of equipment • Successful project execution
Methods, equipment and facilities used in performing professional tasks	Tasks/Activities • Breakdown, preventive, predictive, condition based • Cost Equipment and facilities • Information technology equipment • Books on standard methods of measurement • Maintenance tool kit

Core Task 5: To Supervise and Inspect Works

Results/outputs	Completed products
Working environment	Industries, workshops, fabrication and construction sites
Level of complexity (frequency)	Daily, weekly, monthly and annually
Performance indicators	- Client satisfaction - Successful project execution and report - Quality products

Core Task 6: To Initiate and Manage Small Business Enterprises	
Results/outputs	• Business ideas recorded • Business plan drafted • Work plan
Working environment	• Industries, workshops, fabrication construction sites, newly self-started enterprise and farms
Level of complexity (Frequency)	• Daily, weekly, monthly and annually
Performance indicators	• Satisfaction of all parties involved • Timely and correct decisions made • Smooth operation of plans
Methods, equipment and facilities used in performing professional tasks	Tasks/Activities • Scanning the environment • Copying from existing businesses • Creativity • Responding to the environmental needs • Market research Facilities and equipment • Computer and stationery • Adverts • Tender documents • Computer and stationery • Planning software • Working drawings • Appraisal forms • Surveillance cameras • Quality products

Core Task 7: To Ensure Safety of Materials, Workers, Equipment and the General Public	
Results	• Safety of materials, workers, equipment and the general public
Working environment	• Industries, workshops, sites, markets, hospitals

Level of complexity	• Routine safety precautions
Performance indicators	• Number of accidents and breakdowns minimised
Methods, equipment and facilities used in performing professional tasks	Tasks/Activities • Record-taking of accidents • Training of workers • Monitoring and evaluating all activities on site • Restricting access to dangerous areas Facilities and equipment • Computers and stationery • Planning software • Tender documents • Fire fighting equipment • Safety gear, charts, notices, flyers

Course Structure

Year 1 (All Modules are Core)		TCHY	NWY	CU
TCTM 101	Applied Technician Mathematics I	112	28	4
TCCS 101	Life skills	56	28	2
TCCA 101	Computer Applications	112	28	4
TCPL 101	Plumbing Technology I	140	28	5
TCPL 102	Plumbing Science I	84	28	3
TCPL 103	Workshop Practice I	112	28	4
TCPL 104	Drawing	112	28	4
TCPL 105	Real Life Project I	112	28	4
Total per Year		840		30
RECESS TERM				
TCME 111	Industrial Training	288	6	5

Year 2 (All Modules are Core)		TCHY	NWY	CU
TCTM 201	Applied Technician Mathematics II	112	28	4
TCBE 201	Entrepreneurship Skills	84	28	3
TCCS 201	Basic Kiswahili	56	28	2
TCPL 201	Plumbing Technology II	140	28	5
TCPL 202	Plumbing Science II	112	28	4
TCPL 203	Workshop Practice II	140	28	5
TCPL 205	Real Life Project II	112	28	4
Total per Year		756		27
RECESS TERM				
TCME 111	Industrial Training	288	6	5

TCHY : Total Contact Hours per Year
 NWY : Number of Weeks per Year
 CU : Credit Units = (TCHY / NWY)

Detailed Module Description of Year 1 Term 1

TCTM 101: Applied Technician Mathematics I Duration: 40 Hours	
Module Overview This module enables the learner to attain some mathematical skills that will facilitate him/her to carry out measurements and estimates as well as have the foundation knowledge required for upgrading. It introduces the learner to calculate the cost of materials, solve problems related to fractions, decimals, percentages, ratios and proportions, areas and volumes of different figures as well as apply the laws of indices and logarithms. This module partly proceeds to Term Two.	
Learning Outcomes By the end of this module, the learner should be able to: • convert metric units and use them in costing of materials. • calculate the areas and volumes of various objects.	
Competences The learner: • converts millimetres to metres and kilogrammes to newtons and tones. • calculates numbers involving highest common multiple (HCM) and lowest common multiple (LCM). • calculates percentages in relation to material costing. • calculates areas of irregular objects using Simpson, mid ordinate and trapezoidal rules. • interprets the drawings by taking scale rule measurements. • costs the bricks and cement using the areas and volume calculation methods. • uses the areas and volume calculation methods to cost the materials for a given task. • applies the laws of indices in solving indicial equations. • rationalises and manipulates indicial equations. • evaluates the logarithms.	
Detailed Module Description	Duration
Sub-module 1: Basic SI Units and Arithmetic Algebra • Metric conversion of SI units • Fractions (LCM and HCM) and decimals • Percentages, ratios and proportions	08 Hours
Sub-module 2: Mensuration • Calculation of area, perimeter, volume and total surface area for regular and irregular figures	12 Hours

• Interpretation of given drawings/diagrams • Cost calculations • Areas of irregular figures [Simpson rule, mid ordinate rule, trapezoidal rule]	
Sub-module 3: Indices and Logarithms • Laws of indices and standard form, fractional indices, negative indices • Indicial equation • Multiplication and division of indices • Rationalisation and equations involving indices • Rules of logarithms • Common logarithms, change of base • Equations involving logarithmic functions, exponential functions and logarithmic graphs • Natural logarithms	20 Hours

TCCS 101: life skills

Duration: 20 Hours

Module Overview

The module equips the learner with skills applied in day-to-day interactions, writing; application letters, Curriculum Vitae (CV) and Minutes. It also helps in technical communications, note taking and gives basic knowledge on HIV and AIDS.

Learning Outcomes

By the end of the module, the learner should be able to:

- communicate effectively in the field of work.
- positively relate with the environment and prevent HIV and AIDS spread.

Competences

The learner:

- listens and, takes notes.
- speaks, interacts and conducts meetings.
- makes an agenda and conducts meetings.
- refrains from communications which are against the standing orders of the firm
- talks and relates well with others at the work place.
- Writes personal Curriculum vitae(CVs), field report, memos, delegation letters, claim letters, stake holders circulars, demand notices.
- Prepares work shop paper for presentation
- Writes suitable adverts and announcements
- gives an account of the origin and history, prevalence rates and current trends of HIV and AIDS in Uganda.
- outlines some HIV/AIDS myths and misconceptions.
educates the public about the myths, misconceptions, facts and prevention of HIV/AIDS.
-

Detailed Module Description

Duration

Sub-module 1: Introduction to Communication Skills

6 Hours

- Fundamental skills:
 - reading
 - listening
 - note taking and note making
 - speaking and interaction skills
- Conducting meetings and interviews
- Interpersonal skills
- Workplace communication

Sub-module 2: Writing Skills • Academic writing: - technical and scientific report writing - curriculum vitae and resume writing - authority and delegation letters - writing of circulars • Office and business writing: - intra- and inter-office communication - business correspondence and memo writing - advert and announcement writing	10 Hours
Sub-module 3: Introduction to HIV and AIDS • Background of HIV and AIDS: meaning, definition, history, current trends and prevalence • Myths and misconceptions on HIV and AIDS • Basic facts on HIV and AIDS	4 Hours

TCCA 101: Computer Applications

Duration : 40 Hours

Module Overview

This module is designed to equip the learner with computer skills of typesetting reports and other documents, enable the use of the Internet for searching required data, carry out simple connections and installations of a computer and its accessories.

Learning Outcome

By the end of the module, the learner should be able to:

- use and manipulate a computer to prepare documents
- search web based information from the internet.

Competences

The learner:

- Identifies different types of computers and describes the application of computer hardware, CPU, hard disc drives, modems, mouse, external speakers.
- removes and replaces computer components
- identifies and uses key board buttons as per their functions.
- identifies letter and numerical buttons on key board.
- typesets data into the computer using key board.
- opens, closes, restarts and changes user accounts.
- Ensures safety and security of a computer
- describes computer operating system, types and functions.
- installs and uninstalls windows operating system, application software and other support programmes.
- locates the desktop start menu,
- creates desktop background and screen saver.
- resizes, opens and closes windows by maximizing and minimizing to task pane.
- copies files from external drive, CD, DVD, flash disc to the computer .
- identifies icons and their application.
- starts, creates or opens a word window, work with text and manage files.
- uses word menus for document editing; e.g. copy, paste, cut.
- saves a document in different formats and to a storage media, e.g. flash disc.
- formats a page and documents.

Detailed Module Description	Duration
Sub-module 1: Introduction to Computers • Origin of computers • Types of computers and computer hardware (CPU, hard disk drives, modems, keyboards, etc) • Computer accessories; scanners, projectors, external speakers • Keyboard basics; function keys, numeric keys and navigation keys • Starting a computer, closing down the computer • Computer software: classification, types, usage and computer components: video card, network cards, cables, read only memory (ROM), random access memory (RAM), monitors, printers, cameras, processors • Safety and security of a computer	10 Hours
Sub-module 2: Operating System • Functions of an operating system • Types, classification and benefits of operating systems • Installation of windows operating system and application software	6 Hours
Sub-module 3: Desktop Main Menu • Start menu • Applications menu • Working with the desktop: background, screen saver • Manipulating open windows: resizing, maximising, minimising, task pane, and tiling windows, etc. • Copying files from different locations • Icons, files and folders	4 Hours
Sub-module 4: Word Processing • Starting, creating and opening a Word window • Working with text • Word menus for document editing e.g. copy, paste, cut • Saving a Word document • Saving a document in different formats and to storage media, e.g. flash disc • Formatting a page and documents; paper size, background colours • Working with tables: rows and columns • Working with drawings, ClipArt and pictures • Mail merging	20 Hours

NCPL 101: Plumbing Technology I

Duration: 50 Hours

Module Overview

The module introduces the learner to roles of a plumber, plumbing tools and the safety measures taken care of when carrying out plumbing works. It enables the learner to care and maintain his/her tools, and to protect oneself and others from possible danger. It also equips the learner with the knowledge of identifying and selecting the correct materials.

Learning Outcome

By the end of this module, the learner should be able to:

- use the tools and equipment correctly.
- observe the safety measures while carrying out plumbing works to limit accidents.
- select the suitable materials for particular tasks.

Competences

The learner:

- describes the originality of plumbing and its importance to humanity.
- carries out the roles of a plumber.
- analyses the difference between health and safety.
- identifies possible causes of accidents on sites/ in workshops and suggests the possible ways of limiting them.
- identifies possible areas prone to accidents in every working situation.
- sensitises workmates, managers and the public on ways of limiting accidents.
- fights fire using water jets, sand and fire extinguishers.
- administers first aid to accident victims.
- communicates effectively, the body parts failures (heart, breathing, paralysis, epilepsy, convulsion, fainting), and suggests the possible remedies.
- upholds clean environment at sites and workshops.
- washes, dries and oils the tools and equipment after the day's work.
- takes note of safety precautions on sites and in workshops.
- separates hazardous waste from the non-hazardous waste.
- identifies toxic gases, liquids, powder/foam, and metals/solids.
- identifies narcotic drugs which are dangerous to human body.
- educates the workmates and the public on the dangers of narcotic drugs.
- prevents accidents.
- suggests the general safety precautions to be observed on sites and in workshops.
- applies the safety precautions while on job and observes the potential risks at the workplace.

• differentiates between tools and equipment used in plumbing. • identifies and uses the electric power tools used by plumbers. • troubleshoots faults in electric tools and maintains them. • takes record of the tools issued out and returned to the store. • identifies the ferrous and non-ferrous metals. • selects and uses the correct metal based on its properties. • selects the suitable plastic for use based on the required properties. • selects and uses the correct pipe jointing material. • lays water mains to final positions. • advises the client on the suitable materials basing on the required properties.	
Detailed Module Description	Duration
Sub-module 1: Introduction to Plumbing • Plumbing and its origin • Roles of a plumber	4 Hours
Sub-module 2: Safety, Health and Hygiene • Difference between health and safety • Causes of accidents in workplaces • Personal safety • Health and hygiene • Effects of accidents on workers, their families and the company • Accidents prevention • Fire fighting methods and equipment used • Possible areas prone to accidents: scaffoldings, excavations, explosives, plants and equipment • Introduction to first aid • Treatment of arc eye, burns/scalds • Electrical injuries • Shock • Body failures (heart, breathing, paralysis, epilepsy, convulsion, fainting) • Bleeding and wounds • Fractures • Health considerations including clean environment, toilets for workers • Introduction to safety, health and environment (SHE) culture • Toxic substances, their handling and disposal (toxic gases, toxic liquids, toxic metals) • Drugs and drug addiction	16 Hours
Sub-module 3: Safe Job Analysis (SJA) • General safety precautions	8 Hours

• Assessment of potential risks • Application of SJA	
Sub-module 4: Plumbing Tools and Equipment • Types of tools and equipment (hand and powered tools) • Application and classification of tools and equipment • General safety of tools and equipment • Care and maintenance of tools and equipment • Electric/ power tools • Tasks and exercises on the use and maintenance of tools and equipment	10 Hours
Sub-module 5: Materials used in Plumbing Work • Non-ferrous metals: types, properties and application in plumbing • Ferrous metals: types, properties and their application in plumbing • Plastics: types in use, properties and their application in plumbing (PVC pipes for water, PVC pipes for waste and soil, PPR, PN6, tanks, cisterns and PN10) • Pipes used for water mains, cold and hot water supply • Pipes used for drainage work and methods of jointing • Jointing materials (adhesives, yarns, thread tapes) • Ceramics	12 Hours

TCPL 102: Plumbing Science I

Duration: 30 Hours

Module Overview

The module introduces the learner to states of matter, thermometers, mass, volume and density. It enables the learner in the identification of states of matter, use of thermometers and calculations of mass, volume and density.

Learning Outcome

By the end of this module, the learner should be able to apply the different states of matter in fabricating plumbing fittings and installations.

Competences

The learner:

- analyses matter and differentiates between the states of matter.
- identifies the properties of solids, liquids and gases and their application.
- applies solvent cement and glue in the liquid state to join the pipes.
- measures and controls temperature of plumbing fittings.
- uses various types of thermometers to read the scale of temperature.
- determines the upper and lower fixed points.
- converts temperature from °F to °C and vice versa.
- determines volume, mass, density and weight of a specific matter.
- carries out measurement of regular objects using the rule.
- carries out measurements of regular and irregular objects using weighing machine.
- determines the volume and density of irregular objects using Archimedes principle.

Detailed Module Description

Duration

Sub-module 1: Matter

- States of matter (solid, liquid, and gases)
- Examples of substances of solids, liquids and gases
- Properties of solids, liquids and gases

04 Hours

Sub-module 2: Temperature

- Measurements of temperature and types of thermometers
- Determination of upper, lower, fixed points and scale of temperature
- Conversion of temperature to other scales

06 Hours

Sub-module 3: Volume, Mass, Density and Weight

20 Hours

• Describing and determining volume, mass, weight and density using standard units • Archimedes principle	
--	--

TCPL 103: Workshop Practice I

Duration: 40 Hours

Module Overview

This module gives the learner the knowledge and skills of using and maintaining different plumbing tools, and the skills and techniques of processing and soldering pipes in the workshop.

Learning Outcomes

By the end of this module, the learner should be able to:

- use and maintain plumbing tools and equipment.
- process pipe materials and fittings to enhance installation.

Competences

The learner:

- classifies tools according to their use.
- uses tools correctly.
- cares and stores tools well.
- marks, cuts a pipe and threads GI and PVC pipes.
- carries out cold and hot bending.
- fits pipes to shape and dimension.
- tests pipes for leakages.
- selects and uses the appropriate forging tools, equipment and materials.
- sets the correct heat temperatures.
- fabricates hawk saw frames.
- chooses the correct moulds for the required tools.
- applies safety precautions and rules.

Detailed Module Description

Duration

Sub-module 1: Bench Work

14 Hours

- Bench work tools – categories:
 - Measuring and marking
 - Cutting, sawing, filing, drilling, riveting and countersunk
- Care of tools and equipment

Sub-module 2: Pipe Processing

16 Hours

- Marking and cutting
- Threading GI and PVC pipes (normal threads and long screw thread) and jointing
- Cold bending (machine bending e.g. hydraulic bending machine)
- Hot bending pipes using forming table with fixed pins or jigs and formation of sockets on PVC pipes (pipes not to exceed 25mm).
- Pipe fitting to shape and dimensions (using fittings, unions, tees, elbows, etc.)

• Leakage testing (visual and testing machine) • Hot pipe bending (the pipe should not exceed 25mm)	
Sub-module 3: Basic Forge Work • Forging metals into some plumbing tools like chisels, hacksaw frames, crowbars, tower locks, hinges, knives, spanners	10 Hours

TCPL 104: Drawing	
Duration: 40 Hours	
Module Overview This module introduces the learner to drawing and equips him/her with techniques of setting paper, drawing of different types of lines, construction of polygons and use of symbols in drawing.	
Learning Outcome By the end of this module, the learner should be able to draw and interpret drawings.	
Competences The learner: • uses drawing instruments. • sets the sheets. • draws boarder lines and title blocks using straight lines. • prints numbers, letters and words. • draws symbols for pipe work and plumbing fixtures. • applies all types of line in drawing. • constructs angles, triangles and quadrilaterals to a given scale using the drawing equipment. • constructs regular polygons to scale.	
Detailed Module Description	Duration
Sub-module 1: Introduction to Drawing • Drawing instruments, maintenance and scale application • Lines • Setting drawing papers on the board • Drawing boarder lines and title blocks • Printing numbers, letters and words • Drawing of symbols for pipe work and plumbing fixtures	10 Hours
Sub-module 2: Types of Lines • Straight lines • Hidden lines / details • Centre lines • Construction lines • Finishes lines • Continuous lines • Broken lines • Boundary lines	06 Hours
Sub-module 3: Geometrical Construction • Construction of angles: 15⁰, 30⁰, 45⁰, 60⁰, 90⁰, 105⁰, 120⁰, 135⁰, 150⁰	16 Hours

• Bisecting of angles • Construction of triangles and quadrilaterals: - Equilateral - Right-angled - Isosceles - Scalene - Square - Rectangle	
Sub-module 4: Construction of Regular Polygons • Pentagon • Hexagon • Octagon • Nonagon	08 Hours

TCPL 105: Real Life Project I

Duration: 40 Hours

Module Overview

This module is intended to enable the learner acquire the skills required in design and fabrication of casements, hinges, rain water gutters, and making a long screw connector.

Learning Outcome

By the end of this module, the learner should be able to select correct materials and tools for the chosen project.

Competences

The learner:

- develops a designed sketch of the required project.
- selects the appropriate materials for the project.
- interprets working drawings.
- estimates required quantity and costs of materials for the project.
- follows sequence for operation.
- produces rain water gutter.
- writes a report.
- presents the report.

Detailed Module Description

Duration

Possible Projects

- Making a pair of casement hinge
- Making a rain water gutter
- Making a long screw connector
- Forging metals to make local tools like hacksaw frame, crowbar
- Fix wash hand basin, sinks, flushing cisterns, WC, shower poses, urinals.
- Development of a cone
- Development of a truncated cone
- Development of a scoop
- Fabricating a stand for storage cistern
- Watering can
- Tool box
- Making builders squares
- Making wall brackets
- Gratings (shower hole covers)
- Making a rake (wooden or metallic)

40 Hours

NOTE: <i>The project(s) should be completed by the end of first year</i>	
--	--

Detailed Module Description of Year 1 Term 2

TCTM 101: Applied Technician Mathematics I	
Duration: 40 Hours	
Module Overview The module introduces the learner to trigonometry, matrices and their application in engineering. It gives the learner the knowledge used in setting out structures and positioning of the technician's ladder/scaffolds to safer leaning angles. This module continues to Term Three.	
Learning Outcome By the end of this module, the learner should be able to apply trigonometry to set out simple templates and pipe bends.	
Competences The learner: • describes Pythagoras theorem and calculates the sine, cosine and tangent of a right angled triangle. • calculates the ladder safe leaning angles and roof pitches. • manipulates trigonometrically, ratios of 300, 450, 600 and their application in finding the areas of plots of land and other surfaces. • draws trigonometric graphs. • calculates the heights and other distances or sides of triangles. • determines the areas of roofs and walls using the sine, cosine and tangent formulae. • adds and subtracts matrices. • transposes matrices. • calculates the determinants of matrices.	
Detailed Module Description	Duration
Sub-module 4: Trigonometry • The general angle • Pythagoras theorem • Graphs of trigonometrical functions • Trigonometrical ratios of 30°, 45°, 60° • The sine formula • Cosine formula • Tangent formula • Half angle formula • Heights and distances	26 Hours
Sub-module 5: Matrices • Addition and subtraction of matrices	14 Hours

• Multiplication and division of a square matrix • Application, order and types • Transpose and inverse of a square matrix • Solution of sets of linear equations • Determinants	
--	--

TCCS 101: Life skills

Duration: 20 Hours

Module Overview

The module is intended to enable the learner improve on his/her discourse writing skills, prepare and make presentations, and educate the public on the spread and control measures of HIV and AIDS.

Learning Outcomes

By the end of the module, the learner should be able to:

- logically make discourse writing.
- prepare and make presentations.
- change his/her behaviour and protect himself/herself and others against HIV and AIDS.

Competences

The learner:

- writes definitions and descriptions correctly and in a logical manner.
- analyses the comparisons between two issues or objects and makes a correct decision.
- narrates the order in which events happened and gives objective arguments.
- prepares a document for presentation and presents it.
- prepares a classroom report and presents it.
- prepares a public document and presents it.
- encourages voluntary counselling and testing (VCT) among the public and peers.
- applies the qualities of a good counsellor during the counselling of the needy.
- guides and encourages clients to visit places where they can access treatment and care.
- describes impact /effects of HIV and AIDS on the families, communities and the country.
- practises good labour laws and good safety health.
- identifies and describes the modes of transmission of HIV/AIDS.
- identifies the risk factors and required changes in the behaviour.
- manages risks and takes preventive measures.
- educates public and peers on risky behaviour and its management.
- demonstrates the correct use of a condom.

Detailed Module Description	Duration
Sub-module 4: Discourse Writing • Definition and descriptive writing • Comparison and contrast • Narration and arguments	10 Hours
Sub-module 5: Presentations • Seminar document preparation and presentation • Classroom report preparation and assessment presentations • Public document preparation and presentations	06 Hours
Sub-module 6: Spread and Control Measures of HIV and AIDS • Modes of transmission • Risk factors • Prevention of HIV and AIDS • Behaviour change	04 Hours

TCCA 101: Computer Applications

Duration: 40 Hours

Module Overview

The module is aimed at helping learners carry out printing, scanning of documents and use the Internet for searching the required information.

Learning Outcomes

The learner should be able to:

- prepare documents on spreadsheets.
- use the Internet to search for the required information.

Competences

The learner:

- installs the printer to a computer.
- describes the procedure followed when printing documents.
- removes used up cartridges and toners and replaces or refills them.
- scans a document or pictures, saves and prints.
- uses the Internet and email to search for notes, news and other required information.
- signs in and creates an email address.
- copies and saves information from the Internet, downloads files, music and pictures to the computer.
- creates a strong password for the email address.
- connects two computers in one room to a local area network (LAN) and shares one printer.
- writes and sends email messages.
- reads received mails.
- draws charts and graphs using the Internet.
- copies files and saves documents from one location to another.
- merges, deletes and inserts excel cells.
- makes the spreadsheets .
- formats spreadsheets for printing.
- prepares bills of quantities (accounts figures) using excel.
- applies excel formulae in adding, multiplying, subtracting and dividing calculations.
- draws charts and graphs using excel and the Internet.

Detailed Module Description

Duration

Sub-module 5: Printing, Scanning and Copying Documents

4 Hours

- Printing documents
- Working with printer cartridges and toners
- Scanning documents and pictures
- Copying

Sub-module 6: Internet and Email

• The Internet, web browsers • Opening a website: website address (url) • Internet searching and search engines • Saving information from the Internet, downloading files, music, pictures to the computer • Electronic mail: - creating email accounts - email folders and attachments - attaching documents to outgoing email - downloading email attachment from incoming email - formatting mail - searching mail - printing mail	16 Hours
Sub-module 7: Working with Spreadsheets • Creating an excel document • Opening and closing an excel document • Entering data to a worksheet, editing and formatting a datasheet • Using formulae and functions • Creating/plotting charts and graphs from excel data values • Inserting tables to excel worksheet • Printing a spreadsheet: page setup, gridlines	20 Hours

TCPL 101: Plumbing Technology I

Duration: 50 Hours

Module Overview

This module imparts the learner with the skills required to carry out installation and maintenance of cold and hot water systems. It gives knowledge of the safety measures that need to be observed while at the workshop and site so as to increase on the production.

Learning Outcome

By the end of this module, the learner should be able to install water supply for domestic cold and hot water systems.

Competences

The learner:

- illustrates the hydrological water cycle using sketches.
- describes the process involved in the hydrological cycle.
- differentiates between surface and underground water sources.
- identifies the types of water obtained from surface and underground sources.
- tests the quality of water.
- protects water from surface and sub-soil pollution.
- installs cold water systems in a building.
- differentiates between direct/constant, indirect/intermittent and modified indirect cold water systems.
- installs water meters.
- reads water meters.
- identifies various types of taps and connects them.
- installs storage cisterns.
- applies water works regulations.
- services taps and valves.
- detects common faults in cold water.
- installs hot water systems in a building.
- differentiates between direct and indirect hot water systems.
- installs boilers, boiler mountings and safety valves.
- installs combined cylinder and tank systems.
- applies water works regulations.

Detailed Module Description

Duration

Sub-module 6: Sources of Water Supply

10 Hours

- Hydrological water cycle
- Surface and underground water sources
- Water quality (surface and underground water)
- Protection against surface and sub-soil pollution

Sub-module 7: Pipe Fittings

24 Hours

• Tapping/connection to water mains • Water meters • Types of taps, valves, cocks, ball valves and their working principles and respective positions • Cold water storage cisterns, connections to storage cisterns, capacities and citing • Water works regulations • Servicing of taps and valves • Common faults in cold water • Thermal jointing of PPR pipes • Adhesive jointing of plastic pipes	
Sub-module 8: Hot Water Systems • Systems of hot water (direct and indirect system of hot water) • Diameters of pipes and their functions • Boilers and boiler mountings safety valves • Combined cylinder and tank system • Horizontal and vertical cylinders • Water works rules and regulations • Secondary circulation /limit of length	16 Hours

TCPL 102: Plumbing Science I

Duration: 30 Hours

Module Overview

This module introduces the learner to water, siphonic action, acids, bases and salts. The knowledge and skills attained in this module will enable the learner test the water for cleanliness and purify water using locally available resources such as sand.

Learning Outcome

By the end of the module, the learner should be able to determine water quality and apply siphon action in plumbing works.

Competences

The learner:

- analyses the properties and types of water.
- carries out tests on water for cleanliness and purity.
- identifies and analyses the properties of acids, bases and salts.
- describes the effects of acids, bases and salts on plumbing materials.
- differentiates between efflorescence and deliquescence.
- determines water of crystallisation.
- applies siphon action to influence the flow of liquids through tubes.
- differentiates between siphonage and siphon.
- guards against unwanted capillarity in the installations.
- carries out capillarity experiment using narrow surfaces and tubes of various radii.
- differentiates cohesion from adhesion.
- applies cohesion and adhesion during the jointing of pipes and other accessories.

Detailed Module Description

Duration

Sub-module 4: Water

8 Hours

- Properties of water
- Types of water
- Water purification and treatment methods using sand and chlorine

Sub-module 5: Acids, Bases and Salts

10 Hours

- Properties of acids, bases and salts
- Water of crystallisation, efflorescence, deliquescence

Sub-module 6: Siphonage

12 Hours

- Siphonic action
- Capillarity
- Cohesion and adhesion

TCPL 103: Workshop Practice I

Duration: 40 Hours

Module Overview

This module equips the learner with the skills of installing sanitary appliances to domestic and industrial facilities. It enables the learner create employment for oneself and offer services to the community.

Learning Outcome

By the end of this module, the learner should be able to install sanitary appliances to both the domestic and industrial facilities.

Competences

The learner:

- fixes wash hand basin (WHB), sinks, flushing cisterns, water closets (WC), shower poses, urinals.
- uses the correct sequences of operation during the installation of fittings.
- interprets working drawings and instructions.
- secures the appliance to square.
- connects water lines to an appliance.
- marks and cuts pipes according to the dimension.
- uses the die and stocks for cutting threads in/on pipe.
- cold bends pipes to required angles.
- hot bends pipes to required angles.
- performs different pipe jointing practices.
- detects and rectifies leakages.
- excavates trenches and taps water from stand taps.
- chases the wall to lay pipes.
- installs pipes on chased portion of the wall and plasters with well mixed mortar.
- uses clips to support exposed pipes (observe the rules).
- surveys correct position for cold water storage cisterns.
- detects and rectifies leakages.
- handles the installations.

Detailed Module Description

Duration

Sub-module 4: Fixing of Sanitary Appliances

18 Hours

- Fixing soil and waste appliances
- Sequence of operation
- Fix to square / alignment
- Water supply connection

Sub-module 5: Water Supply to Sanitary Appliances

22 Hours

• Ground excavation, mechanism of tapping water and wall chasing • Installation of pipes and pipe supports (types of clips) • Outside/inside storage cisterns • Inspection and testing of installations (visual, hydraulic/ leakage test mechanism) • Commissioning of the installations	
--	--

TCPL 104: Drawing

Duration: 40 Hours

Module Overview

The module introduces the learner to geometrical construction and development of various shapes as applied in plumbing. It equips the learner with the skills of using the drawing equipment to develop an intended outlook and template of the required fitting.

Learning Outcome

By the end of this module, the learner should be able to design and draw plumbing fittings.

Competences

The learner:

- inscribes and circumscribes triangles and polygons into the other.
- enlarges and transforms figures, circles, ellipses and tangents to a given shape.
- draws the developments of parallel and radial lines.
- draws the development of various fittings (elbow, T- and Y- junctions).
- draws the development of a cylinder.
- draws the development of a cone and truncated cone.
- draws the development of a square bend of two to three pieces.
- draws the development of a funnel.
- draws the development of a scoop.
- develops and draws intersection of branch pipes of same diameter.
- develops and draws intersection of branch pipes of unequal diameter.

Detailed Module Description

Duration

Sub-module 5: Development of Polygons

12 Hours

- Inscribing and circumscribing triangles and polygons
- Enlargement and transformation of figures
- Circles
- Ellipses
- Tangents

Sub-module 6: Developments of Shapes

12 Hours

- Parallel line development
- Radial line development
- Development of an elbow
- Development of a cylinder
- Development of a square bend of two to three pieces
- Development of T- and Y-junctions
- Development of a cone
- Development of a truncated cone
- Development of a funnel

• Development of a scoop	
Sub-module 7: Interpenetration • Branch connection of same diameter at angle of 90° and 45°. • Branch connection of unequal diameter at angle of 90° and 45°.	16 Hours

TCPL 105: Real Life Project I

Duration: 40 Hours

Module Overview

This module is intended to enable the learner acquire the skills required in design and fabrication of casements, hinges, rain water gutters, and make a long screw connector.

Learning Outcome

By the end of this module, the learner should be able to select correct materials and tools for the chosen project.

Competences

The learner:

- develops a designed sketch of the required project.
- selects the appropriate materials for the project.
- interprets working drawings.
- estimates required quantity and costs of materials for the project.
- follows sequence for operation.
- produces rain water gutters.
- writes a report.
- presents the report.

Detailed Module Description

Duration

Possible Projects

40 Hours

- Making a pair of casement hinge
- Making a rain water gutter
- Making a long screw connector
- Forging metals to make local tools like hacksaw frame, crowbar
- Fix wash hand basin, sinks, flushing cisterns, WC, shower poses, urinals.
- Development of a cone
- Development of a truncated cone
- Development of a scoop
- Fabricating a stand for storage cistern
- Watering can
- Tool box
- Making builders squares
- Making wall brackets
- Gratings (shower hole covers)
- Making a rake (wooden or metallic)

NOTE: <i>The project(s) should be completed by the end of first year</i>	
--	--

Detailed Module Description of Year 1 Term 3

TCTM 101: Applied Technician Mathematics I Duration: 32 Hours	
Module Overview The module introduces the learner to the concepts of complex numbers, vectors and matrices, their relevance in the construction industry and further career upgrading. The knowledge attained in this module shall be more useful when analysing the flow of fluids in pipes.	
Learning Outcomes By the end of the module, the learner should be able to: • solve equations involving complex numbers. • evaluate vectors.	
Competences The learner: • represents the identities applied in complex numbers. • adds and subtracts complex numbers. • manipulates equal, polar and exponential forms of equations of complex numbers. • graphically represents complex numbers to standard forms. • manipulates equations involving vectors, by addition, subtraction and multiplication. • represents vectors on graphs.	
Detailed Module Description	Duration
Sub-module 6: Complex Numbers • Equal complex numbers • Graphical representation of complex numbers • Polar form of complex numbers • Exponential form of a complex numbers	16 Hours
Sub-module 7: Vectors • Introduction to vector representation • Manipulation of vectors • Types of vectors • Addition of vectors • Subtraction of vectors	16 Hours
TCCS 101: life skills Duration: 16 Hours	
Module Overview	

The module introduces the learner to oral and interpersonal communication skills. It also equips him/her with knowledge about occupational working environment and creates in him/her public awareness of the impact and interventions to combat HIV and AIDS.	
Learning Outcomes By the end of the module, the learner should be able to: • communicate effectively orally in the field of work. • improve the working environment for effective production and output. • educate the public on the impact and interventions to combat HIV and AIDS in Uganda.	
Competences The learner: • develops basic listening skills. • identifies the barriers to effective listening. • develops public speaking principles. • prepares for and conducts meetings. • makes an agenda for the meeting and writes minutes. • conducts interviews. • describes the roles of the Chairperson and Secretary to the meeting. • educates the public on the importance of upholding good labour laws and good safety and health conditions at work and at home. • describes good labour laws and good safety and health conditions at workplaces and homes. • practises good labour laws and good safety health. • manages and encourages voluntary counselling and testing (VCT) among the public and peers. • applies the qualities of a good counsellor during the counselling of the needy. • guides and encourages clients to visit places where they can access treatment and care. • describes impacts /effects of HIV and AIDS in the families, communities and the country.	
Detailed Module Description	Duration
Sub-module 7: Oral Communication Skills • Listening and speaking • Conducting meetings and interviews • Phone messaging • Customer care language	06 Hours
Sub-module 8: Working Environment • Labour laws and regulations • Health and safety	04 Hours

• Environment • Gender and mainstreaming of gender • Population growth / trends • Human rights • Social structure • Economic structure	
Sub-module 9: Impact and Interventions of HIV and AIDS • Impact of HIV and AIDS • Interventions to combat HIV and AIDS • Counselling and testing • Treatment, care and support • Mitigation of stigma and discrimination • Disclosure of HIV status • HIV and AIDS Workplace Policy for Uganda	06 Hours

TCPL 101: Computer Applications

Duration: 32 Hours

Module Overview

The module enables the learner to acquire the required skills of working with presentations and basic networking for at least two computers. It enables the learner to start and manage a computer shop to create self-employment.

Learning Outcome

By the end of this module, the learner should be able to connect at least two computers to one local area network and share one printer.

Competences

The learner:

- prepares work on Ms PowerPoint slides.
- edits the work on slides.
- activates animations presentation.
- runs a full slide show.
- differentiates between wireless and cable networking.
- connects a network cable to computers.
- installs a network modem to a personal computer (pc).
- troubleshoots simple network connection problems.

Detailed Module Description

Duration

Sub-module 8: PowerPoint Presentations

14 Hours

- Creating a new presentation
- Opening and closing a presentation
- Saving a presentation document
- Transferring a presentation to storage media and different formats
- Adding and formatting text, pictures and media
- Creating and running a slideshow
- Printing presentation slides

Sub-module 9: Basic Networking

18 Hours

- Introduction to computer networking
- Types of network: wide area networks (WAN), local area network (LAN)
- Types of communication media: cables, wireless, optic fibres
- Local area network topologies: star topology, ring topology, mesh topology, bar topology
- Connecting a computer to a network
- Configuring an Internet Protocol Address (IPA)
- Creating a simple network of at least two computers
- Sharing files between computers on a simple network
- Troubleshooting simple connection problems

- | | |
|---|--|
| • Connecting and configuring a printer on a network | |
|---|--|

TCPL 101: Plumbing Technology I

Duration: 40 Hours

The Module Overview

This module introduces the learner to sanitary appliances, sheet metal processing, soldering and environmental concerns in industries. It enables the learner carry out soldering works and the correct methods of disposing waste.

Learning Outcome

By the end of this module, the learner should be able to install sanitary appliances, maintain and manage the environment.

Competences

The learner:

- identifies categories of sanitary appliances and the fixing heights.
- selects and installs waste pipes for a particular number of users.
- installs waste water preventers, automatic flushing cisterns, flushing valves and troughs.
- identifies sanitary traps used in domestic and industrial installations.
- locates WC and other appliances in an apartment.
- estimates the suitable size of gutters in reference to the roof surface area.
- selects the suitable material and prepares welts, soakers and seams.
- fabricates gutters.
- selects materials for soldering.
- prepares the surfaces ready for soldering.
- rivets articles and joints.
- displays warning notices and gazettes the danger zones.
- writes talking safety messages for public awareness on safety and conformity on cards and displays them in convenient areas.
- writes and pins notices about industrial hygiene and noise as routine reminders.
- sorts and classifies waste according to its type by separating hazardous from non-hazardous waste.
- identifies the possible handling techniques and management of waste.
- surveys the correct positions for the construction of surface drainage.
- sets gradients for surface drainage.
- builds catchment areas for silts and other matter flowing in surface drainage.

Detailed Module Description	Duration
Sub-module 9: Sanitary Appliances • Categories of sanitary appliances • Installations and fixing heights • Waste pipe diameters • Sanitary traps • Methods of flushing soil water • Waste water preventers • Automatic flushing cisterns, flushing valves and troughs • Sanitary accommodation • Ventilation and lighting • Size of the WC apartment • Location from habitable places • Scale provision of sanitary appliances	14 Hours
Sub-module 10: Sheet Metal Processing • Gutters • Welts /seams • Soakers	08 Hours
Sub-module 11: Soldering and Riveting • Types of soldering • Composition of solders • Practical soldering techniques • Fluxes • Riveting • Riveting equipment • Riveting materials	8 Hours
Sub-module 12: Safe Working Practices • Lifting operations • Handling of non-conformities	4 Hours
Sub-module 13: Environmental Concerns and Waste Management • Industrial hygiene • Occupational noise • Radiation • Types of wastes (decomposing and non-decomposing waste, and their management) • Hazardous waste pickup and disposal (hazardous and non-hazardous waste and their management) • Surface drainage management and landscaping	6 Hours

TCPL 102: Plumbing Science I

Duration: 24 Hours

Module Overview

The module introduces the learner to water hammer, corrosion and friction. The knowledge and skills acquired in this module shall enable the learner to protect metal surfaces against rust and other harsh environmental conditions.

Learning Outcome

By the end of the module, the learner should be able to limit water hammer, minimise corrosion and apply friction in the installation of plumbing work.

Competences

The learner:

- analyses the causes and effects of water hammer on appliances.
- develops methods of limiting water hammer.
- identifies and selects air vessels used in plumbing to control water hammer.
- describes corrosion, identifies its causes and controls it.
- researches on methods of preventing corrosion.
- paints surfaces liable to corrode.
- provides adequate concrete cover to reinforce steel bars and other corroding metals.
- analyses the advantages and disadvantages of friction in plumbing field.
- applies friction in sharpening chisels, grooving and threading pipes.

Detailed Module Description	Duration
Sub-module 7: Water Hammer • Water hammer, effects of water hammer on plumbing appliances, causes of water hammer • Air vessel	8 Hours
Sub-module 8: Corrosion • Forms of corrosion • Materials that corrode • Prevention • Experiments for corrosion	10 Hours
Sub-module 9: Friction • Types of friction • Laws of friction • Application and effects of friction	6 Hours

TCPL 103: Workshop Practice I

Duration: 32 Hours

The Module Overview

The module gives the learner the skills of tapings, connections, gas welding and maintenance work as applied on the routine maintenance and repairs.

Learning Outcomes

By the end of the module, the learner should be able to:

- maintain appliances and fittings.
- form tapping and make connections.
- fabricate products by using gas welding equipment and accessories.

Competences:

The learner:

- identifies faults in a plumbing installation.
- develops sketches of the replacement.
- identifies the causes of the fault.
- replaces and repairs faults.
- surveys the suitable routes for the water mains.
- excavates trenches and lays water mains.
- identifies various storage vessels.
- connects branch pipes to a water main.
- selects materials for soldering.
- prepares the surfaces ready for soldering.
- selects types of fluxes and solder articles.
- rivets joints and articles.
- describes gas welding and its welding process.
- identifies, selects and describes the materials used in gas welding.
- differentiates between acetylene and oxy gas cylinders.
- prepares pipe surfaces ready for joining.
- adjusts acetylene and oxy gases to correct pressures and ratio.
- joins pipes by gas welding.

Detailed Module Description

Duration

Sub-module 6: Maintenance of Appliances and Fittings

08 Hours

- Servicing of taps and valves
- Replacing siphons
- Repairing leakages

Sub-module 7: Tapping and Making Connections

08 Hours

- Water mains
- Laying water mains
- Sizes of water mains

• Storage vessels	
Sub-module 8: Soldering and Riveting • Types of soldering • Composition of solders • Fluxes • Riveting	08 Hours
Sub-module 9: Gas Welding • Welding equipment • Gas welding materials • Using steel pipes, GI sheets and angles • Safety gears used during welding operations • Possible causes of welding workshop accidents and damages	08 Hours

TCPL 104: Drawing

Duration: 32 Hours

Module Overview

This module introduces the learner to drawing of objects in isometric projection and enables him/her to develop the techniques and skills of interpreting drawings.

Learning Outcome

The learner should be able to make sketches in 3D and draw objects in isometric projection to a given scale.

Competences:

The learner:

- illustrates the symbols used on 1st and 3rd angle orthographic projections using sketches and drawings.
- draws orthographic projections of water closets, cisterns, manholes, septic tanks, sinks and pipe fittings.
- describes the principle of 3D/isometric sketches and drawings.
- differentiates between isometric and oblique projections.
- sketches and draws rectangles, cubes, cylinders, circles, cones in 3D and isometric.
- prints and carries out lettering on drawings.
- carries out the dimensioning of the drawings.
- hatches the drawings.
- sets the drawing sheet.
- draws to given scale.
- draws parallel projection in which an object appears to be rotated to show all its three dimensions.

Detailed Module Description

Duration

Sub-module 8: Orthographic Projection

12 Hours

- Symbols of 1st and 3rd angle orthographic projections
- Sketching and scale applications and reading
- 1st angle and 3rd angle orthographic projection of water closets, cisterns, manholes, septic tanks, sinks and pipe fittings

Sub-module 9: Principles of Isometric Projection

12 Hours

- 3D sketching of water closets, cisterns, pipe fittings, pipe bends
- Rectangle
- Cubes
- Cylinder
- Circle

Sub-module 10: Oblique Projections

08 Hours

• Axonometric projection	
--------------------------	--

TCPL 105: Real Life Project I

Duration: 32 Hours

Module Overview

This module equips the learner with skills required to design and produce complete articles/fittings. It also enables the learner to get acquainted with the use of tools and equipment for forging and fabrication articles.

Learning Outcome

The learner should be able to produce a complete article/unit or product.

Competences

The learner:

- selects appropriate materials for the project.
- identifies the correct tools, equipment and machines for the project/ job.
- interprets working drawings.
- follows the correct sequence of operation.
- observes safety and health precautions.
- constructs articles/ units/ objects.
- measures the correct sizes with tolerances.
- prepares the surface/work pieces.
- bends the work pieces correctly to required angles/shapes.
- selects the suitable type of wood that can be used for rake making.
- treats the timber/wood.
- estimates and costs the required materials.

Detailed Module Description

Duration

Possible Projects

32 Hours

- Making a pair of casement hinge
- Making a rain water gutter
- Making a long screw connector
- Forging metals to make local tools like hacksaw frame, crowbar
- Fix wash hand basin, sinks, flushing cisterns, WC, shower poses, urinals.
- Development of a cone
- Development of a truncated cone
- Development of a scoop
- Fabricating a stand for storage cistern
- Watering can
- Tool box
- Making builders squares
- Making wall brackets
- Gratings (shower hole covers)
- Making a rake (wooden or metallic)

NOTE: <i>The project(s) should be completed by the end of first year</i>	
--	--

NCPL 106: Industrial Training 1

Duration: 288 Hours

Module Overview

This module introduces the concept of attachment of learners to sites/industries, workshops and practical training in drainage works, pavement works, plumbing installation and metal fabrication works. It helps the learner improve on his/her interpersonal communication with colleagues and the general public.

Learning Outcome

The learner should be able to demonstrate and practise skills in plumbing and metal fabrication works.

Competences

The learner:

- acquaints himself/herself with industry and site.
- familiarises with equipment, tools and sites.
- acquires skills in repair, maintenance and construction of new buildings and structures.
- bends pipes.
- threads pipes.
- performs plumbing installations and their related tasks.
- manufactures products using mass and reinforced concrete like VIP slabs.
- plumbs and levels walls.
- applies plaster and render on surfaces.
- writes and makes presentations on industrial/field/site work.
- sets out and starts septic tank construction.
- keeps site records.
- communicates with workmates and supervisors.
- takes and implements instruction.

Detailed Module Description	
Some of the activities that learners are expected to participate in include: • acquaintance with industry and sites • familiarisation with equipment, tools and sites • acquisition of skills in repair, maintenance and construction of new buildings and structures • bending of pipes • threading of pipes • domestic installation of cold water and hot water systems • construction of drainage channels • repair of existing systems	288 hours (6 weeks)

Detailed Module Description of Year 2 Term 1

TCTM 201: Applied Technician Mathematics II Duration: 40 Hours	
Module Overview The module introduces learners to equations, elementary polynomial and binomial theorem, their application and importance in the manufacturing industry.	
Learning Outcome By the end of this module, the learner should be able to transform formulae and evaluate variables.	
Competences The learner: • evaluates independent variables. • transposes various formulae. • applies the transposition of formulae in manipulating and solving production related problems. • factorises quadratic equations. • solves polynomial equations by applying the remainder theorem. • solves general polynomial equations. • expresses binomial theorem on Pascal's triangle. • manipulates binomial theorem equations.	
Detailed Module Description	Duration
Sub-module 1: Expressions of Equations • Evaluating expressions • Equations • Evaluating independent variables • Transposition of formulae	12 Hours
Sub-module 2: Polynomial Equations • Polynomial expression, equations of polynomials • Remainder theorem • Factorisation of quadratic polynomials	14 Hours
Sub-module 3: Binomial Theorem • Expansion of binomial expressions: Pascal's triangle, the binomial theorem for 'n' a positive integer • The general binomial expansion $(1+x)^n$ for $1 < x < 1$ and for $1 < x > 1$	14 Hours

TCBE 201: Entrepreneurship Skills

Duration: 30 Hours

Module Overview

The content for Term One introduces the learner to fundamentals of entrepreneurship that enable one to scan the environment for viable business opportunities. The learner will acquire entrepreneurial skills to turn challenges into opportunities by taking risks through planning, creativity and innovation.

Learning Outcome

By the end of this term, the learner should be able to:

- explain the meaning of entrepreneurship.
- conduct a feasibility study.
- mobilise resources and start up an enterprise.

Competences

The learner:

- differentiates entrepreneurship from ordinary business ventures.
- exhibits qualities of a good entrepreneur.
- practises entrepreneurial ethics.
- scans the environment for business opportunities.
- generates ideas for the business.
- selects a viable business idea.
- obtains rights to protect personal business.
- portrays the characteristics of innovativeness and creativity.
- identifies forces of innovation.
- devises means of overcoming barriers to creative thinking.
- selects the most appropriate form of business to operate.
- draws a simple business plan.
- prepares a simple budget for the business.
- registers a business.
- mobilises resources for starting a business.
- locates a business in a suitable environment.

Detailed Module Description

Duration

Sub-module 1: Introduction to Entrepreneurship

- Meaning of entrepreneurship
- Qualities of an entrepreneur
- Entrepreneurial ethics

03 Hours

Sub-module 2: Environmental Analysis

- Meaning of environment
- Scanning the environment for business opportunities
- Generating business ideas
- Evaluation and selection of business ideas

10 Hours

• Protection of business (trademark and patent rights)	
Sub-module 3: Innovation and Creativity • Meaning of innovation and creativity • Characteristics of innovative persons • Forces of innovation • Barriers to creativity and innovation	04 Hours
Sub-module 4: Business Planning • Forms of small business ownership (sole proprietorship and partnership) • Uses of a business plan • Parts of a business plan • Designing a simple business plan • Developing a simple budget	09 Hours
Sub-module 5: Implementing a Business Plan • Registering a sole proprietorship and partnership • Mobilising business resources - Financial resources - Human resources - Plant, machinery and equipment • Locating a business	04 Hours

TCCS 201: Basic Kiswahili

Duration: 20 Hours

Module Overview

This module introduces the learner to the basic Kiswahili used in industries and by the general public to carry out daily business. It also enables the learner to carry out his/her profession in any part of East Africa where Kiswahili language is the major language of communication.

Learning Outcome

By the end of the module, the learner should be able to seek for and get help in Kiswahili.

Competences

The learner:

- acknowledges the importance of learning and using Kiswahili language.
- greets peers, supervisors and others in Kiswahili.
- names places and people in their capacities.
- appreciates others by saying 'thank you' and 'well-done' in Kiswahili.

Detailed Module Description

Duration

Sub-module 1: Introduction to Kiswahili

2 Hours

- Origin and spread of Kiswahili
- Importance of Kiswahili to Uganda and other East African countries

Sub-module 2: Polite Language

18 Hours

- Greetings to peers, age-mates, parents, elderly and supervisors
- Salutations at different times of the day
- Appreciation and saying 'thank you' for work done, gifts, food and so on
- Asking for directions, assistance, food and so on
- Names of places like schools, hospitals, markets, garages, roads, airports, water wells, forests, villages, towns, sites, hills
- Names of people and professional titles like technicians, nurses, messengers, watchmen, drivers, doctors, teachers, students

TCPL 201: Plumbing Technology II

Duration: 50 Hours

Module Overview

This module introduces the learner to water treatment and water heaters. The knowledge and skills attained in this module enable the learner to carry out the installation and maintenance of water heaters in domestic and industrial settings.

Learning Outcomes

By the end of this module, the learner should be able to:

- treat water to consumable standards.
- install, maintain and repair water heaters.

Competences

The learner:

- describes the physical appearance of water.
- identifies water pollutants.
- carries out tests on water impurities.
- describes different methods of water treatment.
- describes stages of water treatment in different methods.
- performs simple water treatment.
- describes different types of water reservoirs.
- determines capacity of simple domestic reservoirs.
- identifies different types of water heaters.
- describes procedures of various methods of heating water.
- identifies types of mixing valves and their uses.
- detects and repairs faults.

Detailed Module Description

Duration

Sub-module 1: Water Treatment

20 Hours

- Water quality
- Water treatment
- Water reservoirs

Sub-module 2: Water Heaters

30 Hours

- Types of water heaters
- Methods of heating water:
 - solar heating
 - electric heating
 - gas heating
 - solid fuel
- Mixing valves
- Common faults in hot water supply

NCPL 202: Plumbing Science II

Duration: 40 Hours

Module Overview

The module introduces the learner to heat, its use, effects, calculations, treatment and application of gas laws. The skills attained in this module will enable the learner carry out heat treatment and forging of pipes and fittings used in installation.

Learning Outcome

By the end of this module, the learner should be able to forge pipes and fittings used in installation by applying heat treatment methods.

Competences

The learner:

- calculates heat quantity.
- applies the principle of heat transfer in heating water.
- measures the amount of heat required to change temperature of an object.
- performs heat loss calculation on structures.
- ignites controlled combustion using different types of fuel.
- applies heat treatment methods to bend pipe fittings.
- identifies and selects material with high and low thermal conductivity.
- applies insulation knowledge in controlling temperature.
- describes Boyles law and Charles law.
- applies Boyles law and Charles law in plumbing work.

Detailed Module Description

Duration

Sub-module 1: Heat

28 Hours

- Quantity of heat
- Heat transfer
- Specific heat capacity
- Coefficient of thermal expansion and bi-metallic strip
- Latent and sensible heat
- Heat loss calculations:
 - U-Values
 - K-Values
- Combustion and oxidation
- Flames
- Heat treatment of metals
- Thermal insulation, conductivity

Sub-module 2: Gas Laws

12 Hours

- Boyles law and Charles law
- Application of each law in plumbing

TCPL 203: Workshop Practice II

Duration: 50 Hours

Module Overview

The module introduces the learner to sheet metal processing, soldering, seam making, pipe processing and arc welding. It equips the learner with techniques and skills of making pipe fittings, rainwater gutters and threads on pipes.

Learning Outcome

By the end of this module, the learner should be able to fabricate plumbing fittings and accessories.

Competences

The learner:

- designs, measures and cuts accurately pieces to designed dimensions.
- joins the shapes appropriately.
- bends the cut pieces to correct measured angles.
- develops sheet metal products.
- threads pipes (both PVC and GI) using die and stock.
- bends pipes to required angles.
- joins pipes from 25mm to 38mm.
- forms sockets on pipes from 25mm to 38mm.
- selects correct welding material for the type of welding.
- prepares welding surface.
- maintains the welding arc.

Detailed Module Description

Duration

Sub-module 1: Sheet Metal Processing

- Sheet metal processing of chutes, ducts, funnels, rain water pipes, cylinders, truncated cylinders, gutters, rain water bends

16 Hours

Sub-module 2: Pipe Processing

- Cold and hot pipe bending, threading, jointing and formation of sockets on pipes from 25mm- 38mm

20 Hours

Sub-module 3: Arc Welding

- Arc welding on steel pipes, GI sheets and angles

14 Hours

TCPL 205: Real Life Project II

Duration: 40 Hours

Module Overview

The module equips the learner with all skills required to design and produce complete articles/units. It links the knowledge attained at the institution with that required in the world of work. It also encourages the learner to start his/her own enterprise.

Learning Outcome

By the end of the module, the learner should be able to produce a complete article/fitting and use it in the installation.

Competences

The learner:

- prepares the spring well site.
- selects all materials and tools required on site.
- builds wooden forms to dimension of spring box.
- excavates spring sites.
- lays masonry blocks or stones without mortar in the joints.
- lays a line of drain tile or stones at right angles to the direction of flow.
- installs spring boxes.
- clears the debris from the mouth of underground streams.
- constructs spring boxes.
- builds headwall and stone fill trenches.
- taps water from main/distribution line.
- harvests rain water.
- sets out cable runs.
- installs domestic single phase lightning circuit.
- terminates cable runs.
- tests the installation.
- protects oneself, installations and the general public against accidents and damage.

Detailed Module Description

Possible Projects

- Protection of a dug shallow well against surface and sub-soil pollution
- Protection of spring wells
- Rain water harvesting in under/above ground tanks
- Water supply (tapping from main/distribution line) connection
- Installation of hand pumps (UI, UII, UIII and UIII modified)
- Installation of water fountains in institutions
- Construction of septic tanks
- Construction of cesspool, soak away pits

Duration

40 Hours

• Construction of surface drainage • Setting out and installing domestic single phase electric circuit • Install a single point water heater, connect supply, and test for leaks and operation. • Install an ordinary solar water heater, make all the connections. Test for leaks and operation. • Install a water closet, construct two manholes 12 meters apart, lay the drain and test for leakages. • Fabricate support/brackets for wash hand basins, kitchen sinks and heaters. • Cast a VIP concrete slab. • Set out and install domestic single phase electric circuit. • Install a gas cooker and test for leaks • Install a refrigerator and test for leaks and operation • Fix glazed tiles in a bathroom / urinal / kitchen • Construct an ecosan toilet while considering the disabled • Fabricate a lift pump • Set out and install domestic single phase electric circuit. NOTE: <i>The project(s) should be completed by the end of second year</i>	
--	--

Detailed Module Description of Year 2 Term 2

TCTM 201: Applied Technician Mathematics II	
Duration: 40 Hours	
Module Overview The module introduces the learner to engineering calculus used in determining the estimated loads that a structure is expected to carry.	
Learning Outcome By the end of this module, the learner should be able to apply calculus in determining the bending moments of beams and other structures.	
Competences The learner: • differentiates the variables from first principle. • differentiates the product and quotient. • applies differential equations in determining beam deflections. • applies integral equations to evaluate the extent of beam deflections. • determines gradient of a curve. • uses integration principle to determine the size and area of a simple structure. • adds fractions to get a common denominator. • manipulates functions in rules. • applies inverse of a function. • draws graphs.	
Detailed Module Description	Duration
Sub-module 4: Differentiation • Differentiation from first principle • Differentiation of product and quotient • Choice of variable	14 Hours
Sub-module 5: Integration: Single and Double Integrals • Integration-the reverse of differentiation • Standard integrals • Functions of linear function of 'x' • Integration of polynomial functions • Integration by partial fractions • Areas under curves	16 Hours
Sub-module 6: Elementary Functions • Functions in rules • Functions and the arithmetic functions • Inverse of function and graphs	10 Hours

TCBE 201: Entrepreneurship Skills

Duration: 30 Hours

Module Overview

This term's content is intended to equip the learner with knowledge, competences, and skills to successfully engage in production and manage a small business. The learner will be trained on how to produce quality goods/services for sale, market the products, and control the financial and human resources of the business.

Learning Outcomes

By the end of this term, the learner should be able to:

- determine the cost of production.
- design appropriate packaging for the product.
- carry out a market survey.
- compute business profits/losses.

Competences

The learner:

- determines the cost of production.
- designs appropriate packaging for the product.
- adds value to the product.
- carries out a market survey.
- applies the 4Ps in marketing a product.
- promotes the products for sale.
- maintains basic business records.
- computes business profits/losses.
- prepares simple income statements, balance sheet and cash flow statements.
- orients employees on business issues.
- maintains a motivated workforce.
- appraises staff.
- incorporates a compensation policy for the employees.
- shares responsibilities with employees.
- recognises the contribution of workmates.
- identifies causes of conflict in small enterprises.
- resolves conflict at the workplace.

Detailed Module Description

Duration

Sub-module 6: Production

06 Hours

- Production costing
- Packaging (protection, handling and preservation of a product)
- Value addition

Sub-module 7: Marketing • Market survey • Marketing mix {Price, Place, People, Product (4Ps)} • Sales promotion	06 Hours
Sub-module 8: Financial Management • Bookkeeping (recording transactions, source documents, journals, balancing accounts, trial balance, bank reconciliation, simple income statement, simple balance sheet) • Simple cash flows	12 Hours
Sub-module 9: Human Resource Management • Orientation • Importance of motivation • Performance appraisal • Compensation in compliance with labour laws • Need for delegation and challenges encountered • Importance of teamwork • Resolving conflict at workplace	06 Hours

TCCS 201: Basic Kiswahili

Duration: 20 Hours

Module Overview

This module introduces the learner to the basic Kiswahili used in industries and by the general public to carry out daily business.

Learning Outcome

By the end of the module, the learner should be able to transact business in Kiswahili.

Competences

The learner:

- counts numbers 0-1,000,000 in Kiswahili.
- identifies and names the parts of the human body in Kiswahili.
- names domestic animals, birds and insects in Kiswahili.
- mentions the days of the week, names the months of the year and tells the true dates.

Detailed Module Description

Duration

Sub-module 3: Comprehension

10 Hours

- Vowels: a e i o u
- Consonants: b, ch, d, dh, f, g, gh, h, j, k, l, m, n, ng, ny, p, r, s, sh, t, th, v, w, y, z
- Counting and numbers 0-9, 10-1,000,000
- Daily and common activities and sayings such as 'welcome', 'have a seat', 'thank you', 'wish you well', 'sorry'
- Parts of the human body like head, legs

Sub-module 4: General Vocabulary

10 Hours

- Names of domestic animals like goats, sheep, cows, pigs, rabbits, dogs, cats
- Names of domestic birds like ducks, turkeys, hens
- Names of insects like mosquitoes, flies, cockroaches
- Months in a year, days of the week, dates and telling time
- Names of objects like doors, windows
- Common usage of Kiswahili; home and garden activities
- Common mistakes to be avoided

TCPL 201: Plumbing Technology II

Duration: 50 Hours

Module Overview

This module introduces the learner to drainage systems. Most residential and industrial buildings are installed with water for use, which has to be removed from the premises to keep the place clean. The knowledge and skills attained in this module enable the learner to carry out the installation of water systems and their accessories, and install the drainage system to remove the waste water from premises.

Learning Outcome

By the end of this module, the learner should be able to construct surface and underground drainage systems.

Competences

The learner:

- differentiates surface and ground drainage systems.
- installs surface ground drainage systems.
- describes principles of above ground drainage systems.
- tests surface and underground drainage systems.
- describes the various terms used in underground drainage.
- identifies and selects materials used for drainage construction.
- joints pipes.
- installs underground drainage pipes and accessories.
- determines the depth of cover for drains in different areas and their gradients.
- ventilates drains and observes safety and health regulations.
- tests underground drainage systems.
- identifies and selects fittings and accessories used for underground drainage systems.
- identifies the best ways of disposing of sewage.
- constructs disposal units for waste and soil matters.
- differentiates shallow, deep, drop, ramp, intermediate and sample manholes.
- locates where manholes are positioned on the drainage system.
- constructs manholes.
- determines the capacity of non-water borne systems.

Detailed Module Description

Duration

Sub-module 3: Surface Drainage

24 Hours

- Types of systems:
 - two pipe system
 - one pipe system
 - single stack system

- modified single stack system - ventilated stack system - fully ventilated stack system • Principles of each system • Testing of sanitary pipes	
Sub-module 4: Underground Drainage • Terms used in drainage work • Types of systems • Drain testing • Fittings and accessories • Interceptors (intercepting trap, grease, interceptor, petrol interceptors, gully trap, mud gully, ant flood, master gully) • Ways of disposing of sewage • Types of systems: combined system, separate system, partially separate system) • Depth for laying drains and gradients • Ventilation of drains, safety and health regulations • Septic tank, lagoons, cesspool and soak away pits	26 Hours

TCPL 202: Plumbing Science II

Duration: 40 Hours

Module Overview

The module provides the learner with the approaches used in determining pressure in fluids, flow rates in pipes and working principles of hydraulic rams. It equips the learner with the knowledge of choosing the correct equipment for a particular purpose.

Learning Outcome

By the end of the module, the learner should be able to determine pressure in fluids and flow rates in pipes and channels.

Competences

The learner:

- determines intensity and total pressure.
- determines atmospheric pressure.
- applies standard measurements of pressure.
- applies the formula to determine the effective length of flow of liquids in pipes and the number of connections/branches made on the main pipe and the diameters.
- determines hydraulic mean depth of pipes flowing half/full bore and gradient/inclination.
- determines the types of flow in pipes (Reynolds number).
- applies the derived formula to calculate flow rates in pipes and channels.
- determines the factors affecting the flow of liquids in a pipeline in fittings expressed as equivalent of pipe length.
- identifies different types of hydraulic rams.
- identifies factors to be considered for the choice of a ram.
- applies the working principles of hydraulic rams.

Detailed Module Description

Duration

Sub-module 3: Pressure

10 Hours

- Intensity of pressure
- Total pressure
- Atmospheric pressure
- Measurements of pressure

Sub-module 4: Hydraulics • Effective length of pipes • Relative discharging power • Relative discharging capacities • Calculations of diameters of pipes (Thomas box) • Hydraulic mean depth and gradient • Types of flow (Reynolds number) • Pipe flow formula (Darcy) • Resistance in fittings expressed as equivalent of pipe length	24 Hours
Sub-module 5: Hydraulic Rams • Types of rams • Factors to be considered for the choice of a ram	06 Hours

TCPL 203: Workshop Practice II

Duration: 50 Hours

Module Overview

The module provides the learner with the skills of installing water heaters, laying of drains and constructing manholes.

Learning Outcome

By the end of this module, the learner should be able to install hot water systems and their disposal facilities.

Competences

The learner:

- installs electric, gas and solar water heaters.
- tests water heaters and boilers.
- repairs and maintains water heaters.
- sets and excavates the ground.
- uses the water level for determining the level the trench bases to prescribed gradients.
- lays and joints the pipes.
- tests the pipes using smoke and water tests.
- sets and excavates the manhole trenches.
- uses the water level for levelling the trench bases.
- finishes the manhole by rendering and fixing of step iron.
- makes the suitable concrete manhole cover.

Detailed Module Description

Sub-module 4: Water Heaters and Boilers

- Installation of water heaters and boilers
- Testing of water heaters and boilers

Duration

20 Hours

Sub-module 5: Drainage Works for Domestic and Industrial

- Excavation and levelling of drainage trenches
- Determining gradient
- Bedding
- Laying pipes
- Jointing pipes
- Testing for drainage line
- Backfilling the trench

18 Hours

Sub-module 6: Construction of Manholes

- Manholes
- Gully chambers
- Benching and invert
- Concrete and cast iron covers

12 hours

TCPL 205: Real Life Project II

Duration: 40 Hours

Module Overview

The module equips the learner with skills required to design and produce fittings and accessories that ease and simplify the installation of water and disposal.

Learning Outcome

By the end of this module, the learner should be able to produce a complete product.

Competences

The learner:

- appreciates his/her role as an upcoming plumber.
- takes care of the tools and equipment under his/her control.
- selects the appropriate materials for the project.
- identifies the correct tools, equipment and machines for the project/jobs.
- develops a designed sketch of the required project.
- follows sequence for operation.
- interprets working drawings.
- observes safety and health at the sites and workshops.
- estimates required quantity and cost of materials for the project.
- negotiates for labour for the work.
- commissions the work.
- sets out cable runs.
- installs domestic single phase lightning circuit.
- terminates cable runs.
- tests the installation.
- protects himself/ herself, installations and the general public against accidents and damage.

Detailed Module Description

Duration

Possible Projects

40 Hours

- Protection of a dug shallow well against surface and sub-soil pollution
- Protection of spring wells
- Rain water harvesting in under/above ground tanks
- Water supply (tapping from main/distribution line) connection
- Installation of hand pumps (UI, UII, UIII and UIII modified)

• Installation of water fountains in institutions • Construction of septic tanks • Construction of cesspool, soak away pits • Construction of surface drainage • Setting out and installing domestic single phase electric circuit • Install a single point water heater, connect supply, and test for leaks and operation. • Install an ordinary solar water heater, make all the connections. Test for leaks and operation. • Install a water closet, construct two manholes 12 meters apart, lay the drain and test for leakages. • Fabricate support/brackets for wash hand basins, kitchen sinks and heaters. • Cast a VIP concrete slab. • Set out and install domestic single phase electric circuit. • Install a gas cooker and test for leaks • Install a refrigerator and test for leaks and operation • Fix glazed tiles in a bathroom / urinal / kitchen • Construct an ecosan toilet while considering the disabled • Fabricate a lift pump • Set out and install domestic single phase electric circuit. NOTE: <i>The project(s) should be completed by the end of second year</i>	
---	--

Detailed Module Description of Year 2 Term 3

TCTM 202: Applied Technician Mathematics II Duration: 32 Hours	
Module Overview The module introduces the learner to concepts of set theory as may be applied in mixing ratios and basic statistics used in recording of day work and site progress. The knowledge attained in this module enables the learner to tally any collected data for a particular purpose, leading to a realistic making of an informed decision.	
Learning Outcomes By the end of this module, the learner should be able to: • apply the set theory in batching and mixing ratios for mortar and concrete. • apply the skills of illustrating histograms in drawing the site operation programme.	
Competences The learner: • identifies and groups elements of a set. • analyses the differences between union, sub-sets and intersection of sets. • applies set theory in grouping building materials. • analyses the relationship between set theory with that of ratios and proportions of building materials. • records information on a frequency distribution sheet. • determines the average of given data. • draws histograms representing given information. • applies the mean arithmetic in analysing the site activities for monthly salary and overtime allowances of workers. • applies the assumed mean for calculating standard deviation of materials costs in the market.	
Detailed Module Description	Duration
Sub-module 7: Theory of Sets • Elements of sets • Union of sets • Intersection	18 Hours

Sub-module 8 : Basic Statistics • Recording of the information and frequency distribution • Types of averages • Histograms • Calculation of mean • Standard deviation • Assumed mean	14 Hours
--	----------

TCBE 201: Entrepreneurship Skills

Duration: 24 Hours

Module Overview

The content for this term introduces the learner to regular business support services to enable successful sourcing for funds to boost the business, manage risks and follow best practices in the industry. It will equip the learner with skills to manage contracts, lobby for financial services, insure business and adhere to tax requirements.

Learning Outcomes

By the end of the term, the learner should be able to:

- execute a contract economically and efficiently.
- save and invest in the business.
- insure the business.
- pay taxes.

Competences

The learner:

- looks for contract information.
- fills and prepares a simple bid document.
- complies with the contract requirements.
- opens and manages a bank account.
- acquires and services a loan.
- selects the most appropriate insurance policy for the business and the workers.
- observes the insurance principles.
- manages the challenges encountered in insurance.
- seeks for compensation when loss is suffered.
- recognises the importance of paying taxes.
- identifies the taxes paid by small businesses.
- calculates the tax payable.
- files tax returns.

Detailed Module Description

Duration

Sub-module 10: Contracting Process

06 Hours

- Sources of contract information
- Bid preparation
- Contract execution and compliance

Sub-module 11: Banking

06 Hours

- Services offered by commercial banks, micro finance institutions and SACCOs
- Types of accounts (savings, current and fixed deposit)
- Acquiring and servicing loans

Sub-module 12: Insurance for Small Businesses • Life and property insurance • Principles of insurance • Process of getting compensation	06 Hours
Sub-module 13: Taxation and other Business Dues • Reasons for paying taxes • Common taxes paid by small businesses: - Local service tax - Property tax - VAT - Income tax - Market dues - Ground rent - Trade licence • Calculating VAT and income tax payable • Filing tax returns	06 Hours

TCCS 201: Basic Kiswahili

Duration: 16 Hours

Module Overview

The module equips the learner with the professional use of Kiswahili in engineering works execution and management. It helps the learner give instructions to teammates or workers who may not be familiar with the English language.

Learning Outcomes

By the end of the module, the learner should be able to:

- name in Kiswahili the tools, equipment and materials used in plumbing.
- outline the titles of the personnel involved in carrying out works.
- use basic Kiswahili in the day-to-day running of the business.

Competences

The learner:

- identifies and names in Kiswahili the tools and equipment and states their uses.
- in Kiswahili differentiates the responsibilities and tasks performed by technicians.
- identifies and names the materials used in engineering.
- develops good attitude towards work, customers and the general public.
- welcomes and handles customers with care and willingness in Kiswahili.
- advertises the product in Kiswahili.

Detailed Module Description

Duration

Sub-module 5: Specific Trade (Professional-related)

06 Hours

Vocabulary

- Names of tools and equipment used by a technician
- Tasks performed by a technician
- Titles of officers in engineering
- Names of materials used in engineering

Sub-module 6: Customer Care and Language

10 Hours

- Attitude to customers, public and the job
- Public relations and persuasive business language
- Advert of products
- Handling customers: welcoming them, asking whether they need help and thanking them

TCPL 201: Plumbing Technology II

Duration: 40 Hours

Module Overview

This module introduces the learner to the role of a building team, timbering of trenches, air conditioning and refrigeration. It enables one to understand the role of each of the personnel in the construction industry. It gives the learner knowledge of the safety measures to be observed when carrying out underground installation.

Learning Outcomes

By the end of this module, the learner should be able to:

- perform the tasks and roles of the building team.
- protect the sides of excavations against collapse.

Competences

The learner:

- identifies and states the roles of different personnel in a building team.
- estimates the quantity of materials in reference to the work at hand.
- costs materials as per standing rate and makes bills of quantities.
- advises the client correctly on suitable materials for the work at hand.
- makes safety notices and displays them in convenient places.
- puts on protective gears while on job.
- erects open and closed timbering for trenches.
- installs air conditioning systems.
- troubleshoots air problems and suggests the suitable solution.
- services air conditioning systems.
- analyses functions of refrigerator parts.
- solders copper pipes.
- selects refrigerators based on the expected uses.

Detailed Module Description	Duration
Sub-module 5: Building Team • Roles played by each personnel in the building team • Materials and labour estimates • Bills of quantities (B.O.Q)	08 Hours
Sub-module 6: Timbering to Trenches • Close and open timbering: shallow, moderately and deep trenches • Materials for timbering • Terms used in timbering • Illustrations and drawings of open and closed timbering • Safety precautions	12 Hours
Sub-module 7: Air Conditioning and Refrigeration	20 Hours

• Air conditioning: - comfort air conditioning - room air conditioning - central units - commercial air conditioning - process air conditioning - desert coolers - filters • Refrigeration: - operation principle of a refrigerator - types of refrigerators - methods of refrigeration - use of refrigerators - care of refrigerators - food freezers - types of freezers - advantages and disadvantages of each - care of freezers	
---	--

TCPL 202: Plumbing Science II

Duration: 32 Hours

Module Overview

The module introduces the learner to the principles of pumps, identification of plastics and calculation of speed, velocity and acceleration of moving objects. The skills attained in this module will enable the learner in identification of correct pumps as well as operate, maintain and repair water pumps.

Learning Outcome

By the end of the module, the learner should be able to operate and maintain pumps.

Competences

The learner:

- analyses the operation of different types of pumps.
- selects the right type of pump based on the environment.
- maintains pumps.
- determines pump capacity by discharge.
- calculates mechanical power provided by the pump on the fluid.
- measures time and distance taken to flow from one end to another.
- determines velocity of liquids.
- determines the size of pipe connection.
- derives Chezy's formula of fluid flow.
- uses Chezy's formula of fluid flow to determine the amount of fluid in a given vessel.
- derives and applies Manning's, Crimp and Bruges formula in determining flow of fluids in vessels.
- identifies effects of heat on plastics and suggests the correct treatment.
- analyses the behaviour of different types of plastics.
- selects and uses plastic materials appropriately.

Detailed Module Description

Duration

Sub-module 6: Pumps

10 Hours

- Types of pumps and their operation
- Selection of suitable water pumps
- Pump calculations
- Pump maintenance

Sub-module 7: Speed, Velocity and Acceleration

12 Hours

- Calculations involving speed, velocity, acceleration and gravitation acceleration in water supply
- Storage connections (examples Bell, Square)
- Kinetic or velocity energy

Sub-module 8: Flow in Drains and Open Channels

10 Hours

• Chezy formula • Manning's, Crimp and Bruges formula	
Sub-module 9: Plastics • Types and structure of plastics • Effects of heat on polythene, PVC and PPR • Plastic behaviour • Advantages and disadvantages of plastics	12 Hours

TCPL 203: Workshop Practice II

Duration: 40 Hours

Module Overview

The module introduces the learner to installation and servicing of air conditioners, refrigerators and fixing of tiles. The skills attained in this module are targeted at equipping the learner with the skills of laying floor and wall tiles.

Learning Outcome

By the end of this module, the learner should be able to:

- install and service air conditioning systems and refrigerators.
- lay tiles on surface with precision.

Competences

The learner:

- identifies the suitable position for air conditioners and refrigerators.
- lays and installs the air conditioning pipes.
- fixes air conditioning units.
- unseals compressors.
- dismantles and assembles air conditioning units.
- services refrigerators and air conditioning components.
- bends copper coils to the required shape.
- prepares surfaces ready to receive tiles.
- mixes mortar/adhesive to the required consistency.
- fixes tiles to square/correct centring.

Detailed Module Description

Duration

Sub-module 7: Installation and Servicing of Air Conditioners and Refrigerators

20 Hours

- Installation of air conditioners and refrigerators
- Maintenance of air conditioners and refrigerators

Sub-module 8: Fixing of Tiles

20 Hours

- Bathrooms and shower rooms
- Around kitchen sinks and wash basins

TCPL 205: Real Life Project II

Duration: 32 Hours

Module Overview

The module equips the learner with skills required to design and construct ecosan toilets, and fabricate other articles as the situation at hand may demand. It also equips the learner with the skill of installing refrigerators in required premises and positions.

Learning Outcomes

By the end of this module, the learner should be able to:

- install refrigerators.
- fix tiles on surfaces.
- construct ecosan toilets.

Competences

The learner:

- takes care of the tools and equipment under his/her control.
- selects the appropriate materials for the project.
- identifies the correct tools, equipment and machines for the project/job.
- develops a designed sketch of the required project.
- follows sequence for operation.
- interprets working drawings.
- observes safety and health at the sites and workshops.
- estimates required quantity and costs of materials for the project.
- negotiates for labour of doing work.
- commissions the work.
- sets out cable runs.
- installs domestic single phase lightning circuit.
- terminates cable runs.
- tests the installation.
- protects oneself, installations and the general public against accidents and damage.

Detailed Module Description

Duration

Possible Projects

32 Hours

- Protection of a dug shallow well against surface and sub-soil pollution
- Protection of spring wells
- Rain water harvesting in under/above ground tanks
- Water supply (tapping from main/distribution line) connection
- Installation of hand pumps (UI, UII, UIII and UIII modified)
- Installation of water fountains in institutions

• Construction of septic tanks • Construction of cesspool, soak away pits • Construction of surface drainage • Setting out and installing domestic single phase electric circuit • Install a single point water heater, connect supply, and test for leaks and operation. • Install an ordinary solar water heater, make all the connections. Test for leaks and operation. • Install a water closet, construct two manholes 12 meters apart, lay the drain and test for leakages. • Fabricate support/brackets for wash hand basins, kitchen sinks and heaters. • Cast a VIP concrete slab. • Set out and install domestic single phase electric circuit. • Install a gas cooker and test for leaks • Install a refrigerator and test for leaks and operation • Fix glazed tiles in a bathroom / urinal / kitchen • Construct an ecosan toilet while considering the disabled • Fabricate a lift pump • Set out and install domestic single phase electric circuit. NOTE: <i>The project(s) should be completed by the end of second year</i>	
--	--

NCPL 206: Industrial Training

Duration: 288 Hours

Module Overview

This module introduces the concept of attachment of learners to sites/industries, workshops and practical training in drainage works, pavement works, plumbing installation and metal fabrication works. It helps the learner improve on his/her interpersonal communication with colleagues and the general public.

Learning Outcome

The learner should be able to demonstrate and practise skills in plumbing and metal fabrication works.

Competences

The learner:

- acquaints himself/herself with industry and site.
- familiarises with equipment, tools and sites.
- acquires skills in repair, maintenance and construction of new buildings and structures.
- bends pipes.
- threads pipes.
- performs plumbing installation and its related tasks.
- manufactures products using mass and reinforced concrete like VIP slabs.
- plumbs and levels walls.
- applies plaster and render on surfaces.
- writes and makes presentations on industrial/field/site work.
- sets out and starts septic tank construction.
- keeps site records.
- communicates with workmates and supervisors.
- takes and implements instructions.

Detailed Module Description

Some of the activities that learners are expected to participate in include:

- Acquaintance with industry and sites
- Familiarisation with equipment, tools and sites
- Acquisition of skills in repair, maintenance and construction of new buildings and structures
- Bending of pipes
- Threading of pipes
- Domestic installation of cold water and hot water systems
- Construction of drainage channels
- Repair of existing systems

288 Hours
(6 weeks)

APPENDICES

Appendix i : Industrial Training Guidelines

The guide lines below should be followed during Industrial Training:

- i) It starts at the end of the 3rd term
- ii) It takes a minimum period of 6 weeks
- iii) It is carried out at the world of work located in any part of Uganda including the training Institutions
- iv) The training Institution has the duty of
 - budgeting for Industrial Training:
 - obtaining money from government for government sponsored learners:
 - explaining to the learners what they are expected to do:
 - finding placements for industrial training :
 - posting learners to industrial training:
 - supervising and assessing learners during Industrial Training.

Supervision

- i) There should be a world of work or field or industry supervisor and an academic supervisor from the training Institution.
- ii) The academic supervisor visits the attachment site or Industry least once, and interacts with both the learner and field supervisor .

Assessment

Assessment marks should be categorized as follows:

- | | |
|---------------------------------------|-----|
| i) Assessment by field supervisor | 50% |
| ii) Assessment by academic supervisor | 30% |
| iii) Field attachment report | 20% |

All the above assessment categories must be carried out for one to complete Industrial Training. The marks awarded by each category must be verified by the mandated examining body.

Appendix ii: Industrial Training Assessment Form for Field or Onsite Supervisor

Name of institution.				
Name of industry.				
Name of student. Signature.				
Registration.				
Name of supervisor.				
Signature.				
Date.				
	Area of Assessment	Marks	Score	Area of Improvement
A	Attendance (% age of days and times within the days present)	5		
B	Work Performance involvement	35		
	1. Ability to communicate effectively	5		
	2. Co-operation with other staff	5		
	3. General ability to use various equipment, machines or plant in the industry	10		
	4. Flexibility-willingness to learn from various sections in industry	7		
	5. Job planning	8		
C	Initiative and	15		

	Innovations			
	1. Problem-solving	8		
	2. New ideas on improvement for efficiency of performance or operations	7		
D	Time Management	5		
	1. Reporting on time	1		
	2. Leaving at specified break-off or stoppage time	1		
	3. Meeting deadlines on assignments given by supervisors or instructors	3		
E	Discipline and Safety Observation	15		
	1. Use of right equipment for right job	4		
	2. Obeying instructions	4		
	3. Proper handling of equipment and or materials	2		
	4. Ability to practice safety measures in the workplace	3		
	5. Knowledge of first aid procedures in case of accident	2		
F	Practical Skills	20		
	1. Ability to put into practice training instructions from	4		

	instructors or supervisors			
	2. Ability to relate theoretical knowledge with practical applications	4		
	3. Proper use of manuals and interpretation of drawings	4		
	4. Ability to carry out trouble shooting on equipment, (put right mistake in work or finishing)	4		
	5. Ability to service and repair equipment (clean and maintain tools and workplace)	4		
G	General Remarks (other assessment at discretion of assessor)	5		

The assessment shall be carried out as indicated in each area and then the total mark obtained is computed to 50%.

Appendix iii: Industrial Training Assessment Form for Academic

Name of Institution.....
Name of Industry
Name of student
Signature.....

Registration Number
 Name of supervisor Signature
 Date

	Area of Assessment	Marks	Score	Area of Improvement
A	Attendance (Was the learner at his work place?)	5		
B	Understanding of tasks	21		
	1. Did the learner provide weekly summary of work performed?	2		
	2. How did the learner describe the tasks performed?	4		
	3. How was the learner able to explain why tasks were being done in a particular way?	3		
	4. How did the learner explain problems experienced when carrying out the work and how they were solved?	3		
	5. How did the learner explain the knowledge and skills acquired at the institute that enabled him to perform?	2		
	6. How did the learner describe the new knowledge and skills gained?	3		
	7. How did the learner explain his relationship with his core workers and supervisors and how he plans to improve or maintain it?	2		

	8. How did the learner relate the industrial training tasks to his training as a technician?	2		
C	General Remarks (Other assessment at discretion of examiner)	4		
Total mark		30		

The assessment shall be carried out as indicated in each area and then the total mark obtained is computed to 30%.



Appendix iv: Field Attachment Report and Guide for Industrial Training

The report should be written in English and contain the following to be assessed as shown:

No	Contents	Maximum Score
1	Cover page: i) Name of institution ii) Name of Department iii) Name of learner and year of study iv) Place of Industrial Training v) Period of Industrial Training e.g. July- September 1510 vi) Academic and Field Supervisor's signatures	1 marks
2	Acknowledgements i) Acknowledge all assistance during field training ii) Acknowledge assistance during report writing	0.5 marks
3	Executive summary or abstract i) To include statement of the most practical work carried out ii) Challenges iii) Conclusions	2 marks
4	Table of contents To show the content of the report and page numbers where they first occur	0.5 marks
5	List of figures i) All figures in the report must have a number and a caption ii) Figures must be numbered according to the chapters where they occur for example; Figure 4.1, to refer to first Figure in chapter 4 iii) The pages where the figures occur must be shown in the list of figures	0.5 marks
6	List of tables i) All tables in the report must have a number and a header ii) Tables must be numbered according to the chapters where they occur for example; Table 2.1, to refer to first table in Chapter 2 iii) The pages where the tables occur must be shown in the list of tables	0.5 marks

7	List of acronyms or abbreviations Acronyms used should be given in alphabetical order with their full meaning shown	0.5 marks
8	Introduction i) Location and description of place of field attachment ii) Objectives of field attachment iii) Structure, organization iv) Tasks carried out by the place attached to e.g. if District Local Government describe its role in society	2 Marks
9	Main body of the report i) Description of work carried out ii) Duties and responsibilities assigned and how they were carried out iii) New knowledge and skills gained iv) Relationship with other staff and supervisor v) Problems experienced and how they were handled	8 marks
10	Conclusions A brief summary of knowledge gained as outlined in the objectives	1mark
11	Recommendations i) For improving Industrial Training, usually derived from problems experienced ii) For improvement of work output at the place of work (this is included if allowed by the field supervisor)	1.5 marks
12	References i) Design standards and guidelines used during training ii) Books and internet material iii) APA style of referencing shall be used	1 mark
13	Appendices i) Drawings ii) Photographs, etc	1 mark
Total mark		20 marks

Bibliography

- Burberry, P. (1984). *Mitchell's Environment and Services*. London. Bats Ford Academic and Educational Ltd.
- Callister, D.W. (2000). *Materials Science and Engineering: An Introduction*. 5th Edition. New York, John Willy and Sons.
- Chudley, R. and Greeno, R. (1999). *Building Construction Handbook*. 3rd Edition; London. Butterworth-Heinemann.
- Comer, D. (1999). *Computer Networks and Internets*. 2nd Edition; Prentice Hall, Inc.
- Everett, A. (1999). *Materials*, 5th Edition. Longman.
- Faber, O. and Kell, J.R. (1987). *Heating and Air Conditioning of Buildings*. The Architects Press.
- Foster, G. (1981). *Construction Site Studies: Production, Administration and Personnel*. London, Longman.
- Fryer, B. (1997). *The Practice of Construction Management*. Macmillan.
- Hancock, D. J. (1982). *Mathematics for Technicians Level 1*. Granada. Technical Series.
- Hancock, D. J. (1982). *Mathematics for Technicians Level 2*. Granada. Technical Series.
- Hancock, D. J. (1982). *Mathematics for Technicians Level 3*. Granada. Technical Series.
- Roberts, K. (1981). *Construction Technology Levels 1-3*. Nelson TEC Books.
- Shelly & Cashman (1980). *Introduction to Computers and Data Processing*. BREA Anaheim Publishing.
- Silbershatz and Galvin (1998). *Operating System Concepts*. 5th Edition; Addison Wesley Publishing.
- Stroud, K.A. (2002). *Engineering Mathematics*. 4th Edition; Macmillan.