

# 10

## Technology and Livelihood Education Information and Communication Technology

### Teaching Guide

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Teaching Guide  
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**K to12 BASIC EDUCATION CURRICULUM**  
**Information and Communications Technology**  
**TECHNICAL DRAFTING (TD)**  
 (SPECIALIZATION)  
**GRADE 10 – MODULE 1**  
**Personal Entrepreneurial Competencies (PECs)**  
**Teacher’s Guide**

Quarter I

4 hrs.

|  |
|--|
| <b>Grade Level Standard</b>  |
| <p>This is a specialization course which leads to Technical Drafting National Certificate Level II (NC II). It covers five (5) core Computer-Aided Drawing (CAD) competencies that a Grade 10 Technology and Livelihood Education (TLE) student ought to possess, namely: 1) prepare Computer-Aided Drawing (CAD); 2) structural layout and details; 3) electrical and electronic layout and details 4) sanitary and plumbing layout and details; 5) mechanical layout and details.</p> <p>The preliminaries of this specialization course include the following: 1) discussion on the relevance of the course; 2) explanation of key concepts relative to the course and; 3) exploration on career opportunities.</p> |
| <b>Content Standard</b>  |
| <p>The learner demonstrates understanding of one’s Personal Entrepreneurial Competencies in Technical Drafting.</p>  |
| <b>Performance Standard</b>  |
| <p>The learner independently creates a plan of action that strengthens and or further develops his/her PECs in Technical Drafting.</p>   |
| <b>Learning Competencies</b>   |
| <p>Develop and strengthen PECs needed in Technical Drafting.</p>   |
| <b>I. Introduction</b>   |
| <p>This teacher’s guide will lead you to effectively and efficiently teach Module 1. Moreover, this will guide you in determining relevant and appropriate teaching techniques and strategies that will fit the learning needs and demands of the learners to make them best understand and</p>  |

appreciate the importance of entrepreneurship and the entrepreneurial competencies related to Technical Drafting.

This module will also provide learners an opportunity to know that individuals possess different PECs. These PECs include characteristics, attributes, lifestyles, skills, or traits. Likewise, when one aligns these competencies with the competencies of successful practitioners or entrepreneurs, he or she will be ready to face the experiences of starting a business or being employed.

Moreover, the module is designed to stimulate the learners to think about entrepreneurship and its role in the business community and in economic and social development.

## **II. Objectives**

With your assistance and the guidance of this module, learners are expected to understand the underlying principles and concepts of PECs, particularly in:

- identifying areas for improvement, development, and growth,
- aligning learners' PECs according to their business or career choice, and
- creating a plan of action that ensures success in their business or career choice.

## **III. Presentation of Content**

### ***Introduction***

- Guide learners in appreciating and understanding PECs for them to be successful in business or in the workforce by sharing inspiring real-life stories of successful businessman and or well-known employees in the field of Technical Drafting in the province.
- Explain to learners the importance of assessing their PECs.
- Guide learners in understanding the importance of entrepreneurs and entrepreneurship.

### ***Objectives***

- Guide learners in identifying and understanding the objectives of Module 1.

### ***Pre-Assessment***

- Use the sample pre-assessment test available in the learners' materials or craft a comprehensive teacher-made test to assess learner's prior knowledge and skills in PECs.
- Evaluate the result of the pre-assessment and prepare a plan of action to strategically address the learning needs and requirements of the learners.

### ***Guide Questions***

- Have learners actively perform task 2, and let them share their answers and relevant experiences with the class.
- Process learners' understanding of the guide questions presented on task 2.

### ***Learning Goals and Target***

- Help learners utilize available technologies / resources in planning their own learning goals and targets as reflected on page 4.

### ***Group Activity***

- Group the learners, then ask them perform task 3. Let them share their thoughts with the class.
- Process learners' understanding and guide them in arriving at a relevant and acceptable generalization.

## **IV. Know, Process, Reflect and Understand, and Transfer**

### ***Know***

- Discuss / present the importance of assessing personal entrepreneurial competencies (PECs) and skills vis-à-vis a practicing entrepreneur or employee; provide an actual example of an entrepreneur or employee existing in your province.
- Expand learner's curiosity by asking essential questions on the important characteristics / traits / attributes, and skills of a good entrepreneur.
- Assist / Guide learners in understanding the entrepreneurial competencies (characteristics, traits, attributes) and skills of a good entrepreneur.
- Have an appropriate, relevant, and timely learning activity for the learners to appreciate the best entrepreneurial competencies.

- Assess learner's knowledge and skills on understanding of topic. Use the result of the pre-assessment to improve their learning.

### ***Process***

- Ask the learners accomplish task 4 (PECs Checklist) on page 8-9. Let them make their interpretation or personal insights based on the accomplished task.
- Facilitate student-to-student interactions and process learners understanding.

### ***Reflect and Understand***

- Deepen learners' understanding of PECs by guiding them in accomplishing task 5 (Interview) on page 9-12.
- Facilitate appropriate learning activities to finish the task.
- Encourage learners to report their accomplishments to the class.
- Process learners' understanding.

### ***Transfer***

- Assist learners in individually accomplishing task 6 (Preparation of a Plan of Action) on page 12. Let them craft their own plan of action intelligently. Have learners present this in class.
- Process their understanding.
- Guide learners in answering the essential questions presented in task 7 on page 13.
- Have learners share their answers with the class, and then process their understanding.
- Provide learners more concrete example and enrichment activities to further deepen their understanding about PECs and its importance in day-to-day living as future entrepreneurs or employees.
- Provide learners applicable activities whereby they can transfer to the community what they have learned.
- Let learners use available resources in the community to accomplish the task.

## V. Feedback

### Pre / Post Assessment

- |      |       |
|------|-------|
| 1. E | 6. B  |
| 2. K | 7. C  |
| 3. H | 8. I  |
| 4. A | 9. D  |
| 5. J | 10. F |

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**K to12 BASIC EDUCATION CURRICULUM**  
**Information and Communications Technology**  
**TECHNICAL DRAFTING (TD)**  
 (SPECIALIZATION)  
**GRADE 10 – MODULE 2**  
**Environment and Market (EM)**  
**Teacher’s Guide**

Quarter I

4 hrs.

|  |
|--|
| <b>Grade Level Standard</b>  |
| <p>This is a specialization course which leads to Technical Drafting National Certificate Level II (NC II). It covers five (5) core Computer-Aided Drawing (CAD) competencies that a Grade 10 Technology and Livelihood Education (TLE) student ought to possess, namely: 1) prepare Computer-Aided Drawing (CAD); 2) structural layout and details; 3) electrical and electronic layout and details 4) sanitary and plumbing layout and details; 5) mechanical layout and details.</p> <p>The preliminaries of this specialization course include the following: 1) discussion on the relevance of the course; 2) explanation of key concepts relative to the course and; 3) exploration on career opportunities.</p> |
| <b>Content Standard</b>  |
| <p>The learner demonstrates understanding of environment and market in Technical Drafting in one’s province.</p>   |
| <b>Performance Standard</b>  |
| <p>The learner independently creates a business vicinity map reflective of potential market in Technical Drafting in a province.</p>   |
| <b>Learning Competencies</b>   |
| <ul style="list-style-type: none"> <li>• Develop a quality and marketable product or service in Technical Drafting</li> <li>• Select a business idea based on the criteria and techniques set</li> <li>• Develop a brand for the product</li> </ul>  |
| <b>I. Introduction</b>   |
| <p>People who aspire to start a business need to explore the economic, cultural, and social conditions prevailing in an area. Needs and wants of the</p>   |

people in a certain area that are not met may be considered as business opportunities. Identifying the needs of the community, its resources, available raw materials, skills, and appropriate technology can help a new entrepreneur in seizing a business opportunity.

To be successful in any kind of business venture, potential entrepreneurs should always look closely at the environment and market. They should always be watchful on the existing opportunities and constraints. The opportunities in the business environment are those factors that provide possibilities for a business to expand and make more profits. Constraints, on the other hand, are those factors that limit the business to grow, hence reduce the chance of generating profit. One of the best ways to evaluate the opportunities and constraints is to conduct Strengths, Weakness, Opportunities and Threats (SWOT) Analysis.

## **II. Objectives**

With your assistance and guidance in facilitating this module, learners are expected to understand the underlying principles and concepts of environment and market more particularly in:

- identifying what is of “value” to the customer,
- identifying the customer to sell to,
- explaining what makes a product unique and competitive,
- applying creativity and innovative techniques to develop marketable product, and
- employing a unique selling proposition (USP) to the product and or service.

## **III. Presentation of Content**

### ***Introduction***

- Using appropriate activities, lead learners in giving value to environment and market and its implication to be successful in a business related to Technical Drafting.
- Guide learners in understanding the importance of environment and market; likewise, lead them in appreciating the value of SWOT Analysis.
- Provide relevant, appropriate, and meaningful examples of SWOT Analysis pertaining to Technical Drafting.
- Help learners in presenting the importance of assessing their immediate environment and market pertaining to Technical Drafting.

- Using your processing and questioning skills, guide learners in coming up with a generalization about the environment and market and its relationship to a successful field of Technical Drafting.

### ***Objectives***

- Guide learners in identifying and understanding the objectives of this module.

### ***Pre-assessment***

- Use the sample pre-assessment test available in the learner's materials or craft a comprehensive teacher-made test to assess learner's prior knowledge and skills in environment and market.
- Evaluate the result of the pre-assessment and prepare a plan of action to strategically address the learning needs and requirements of the learners.

### ***Guide Questions***

- Ask learners to perform task 2 and guide them in presenting their answers to the class.
- Process learners' responses and guide them in making appropriate generalizations.

### ***Learning Goals and Target***

- Help learners in planning their own learning goals and target as reflected on page 18.
- Provide enrichment activities and guide them in analyzing available resources and technology in the community to be used in accomplishing their learning goals and targets.

## **IV. Know, Process, Reflect and Understand, and Transfer**

### ***Product development***

#### ***Know***

- Discuss product development, concept of developing a product, finding value, innovation, unique selling proposition, and its relationship to environment and market and business at large.
- Let learners participate in the discussion on the aforementioned topics. Assist and/or guide learners in presenting their ideas and relevant experiences.
- Design varied levels of learning activities for the learners to better understand the topics related above.

- Guide learners in reflecting on the importance of product development, concept of developing a product, finding value, innovation, and unique selling proposition.
- Design an assessment to evaluate learners' knowledge, skills, and understanding of the previous topics.
- Use the result of the assessment in designing / developing learning activities that will enrich learners' understanding.

### ***Process***

- Guide learners in accomplishing task 3 on pages 24 to 25. Let them conduct a research by interviewing a successful entrepreneur or practitioner within the province.
- Have learners present their research to the class. Process their understanding in relation to the objectives of this module.

### ***Reflect and Understand***

- Inspire learners to deepen their understanding about the environment and market by carefully watching the videos related to the prescribed topics on task 4 on page 25.
- After watching the videos, let them prepare a comprehensive narrative report on the topics they watched.
- Encourage learners to present their accomplishments to the class.
- Process learners' understanding in relation to the objectives of this module.

### ***Transfer***

- Guide learners in developing concepts for their own product or service as reflected on task 5 on page 26.
- Assist learners in analyzing and utilizing available resources in developing their concept of their own product or service.
- Evaluate learners' output by referring to teacher-made rubrics which is aligned to the performance standards.
- Let learners eloquently share and present their output with the class.
- Lead learners in reflecting on the importance of product conceptualization.

### ***Generating Ideas for Business***

### ***Know***

- Let learners read and understand topics related to generating ideas for business, selecting a business idea, and branding.
- Let learners undergo varied levels of learning activities to better appreciate the importance of generating ideas for business, selecting a business idea, and branding.
- Process learners' understanding relative to the objectives of this module.

### ***Process***

- Lead learners in reflecting on their SWOT Analysis and its importance in generating business ideas by engaging them in learning opportunities for interaction with others outside the classroom and with the use of technology.
- Instruct learners to enrich their knowledge on SWOT Analysis by conducting researches.
- Provide an appropriate type of assessment to evaluate learners' understanding of the SWOT Analysis. Use the result of the assessment to craft more appropriate and productive learning activities.
- Assist learners in performing task 6 (SWOT Analysis).
- Evaluate / Assess learners' output and check it against the objectives of this module.

### ***Reflect and Understand***

- Let learners work on an independent learning activity or cooperative learning (ICL) in accomplishing task 7 (Extra Readings and Video Viewing) on page 33.
- Assist learners in presenting their output. Assess the evidence of learning and provide useful input to improve their output.

### ***Transfer***

- Have learners prepare task 8 (Designing a Logo). Assist learners in accomplishing this task by letting them adhere to their real life experience.
- Assess learners' output using teacher-made rubrics following the standards and objectives of this module.
- Have learners prepare task 9 (Making My Own Vicinity Map). Guide learners in creating their own vicinity map reflective of potential market in Technical Drafting in your province. Ask them to present their output and process their understanding by asking

relevant and essential questions.

- Assess learners' output using teacher-made rubrics following the standards and objectives of this module.

### **V – Feedback**

#### **Pre / Post Assessment**

- |      |       |
|------|-------|
| 1. D | 6. D  |
| 2. C | 7. B  |
| 3. A | 8. C  |
| 4. B | 9. D  |
| 5. A | 10. D |

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K to12 BASIC EDUCATION CURRICULUM  
Information and Communications Technology  
**TECHNICAL DRAFTING**  
Grade 10

**Module 3: Preparing Drawings Using Computer-Aided Design (CAD)**

**Quarter I and II**

**80 hrs.**

**Grade Level Standard**

Technology and Livelihood Education (TLE) of the K to 12 Basic Education Program (BEP) is composed of four components namely: Agri-Fishery Arts, Home Economics, Industrial Arts and Information and Communication Technology (ICT). In this module, the focus is on ICT-TD Preparing Drawings using Computer-Aided Design (CAD).

This module focuses on *Process and Delivery* enriched with hands-on activities that will assess learners' level of knowledge and skills. Learning procedures are divided into different sections such as: What to Know, What to Process, What to Reflect on and Understand, and What to Transfer.

**Content Standard**

The learner demonstrates understanding of concepts and underlying principles in the preparation of plan using computer aided-design (CAD).

**Performance Standard**

The learner independently prepares computer-aided design plans based on established industry and/or job requirements.

**Learning Competencies**

The competencies expressed as learning outcomes in this teaching guide are the exact competencies that will be used to assess the learners/trainees for them to secure COC or NC in Technical Drafting.

This teaching guide would allow teachers/instructors to strategically teach the competencies spread out in the module; guide the learners in performing the activities; process learner's understanding; and assist the learners in applying what they have learned to an entirely new context.

Utilizing effective teaching methodology and strategies suitable to the learning needs and requirements of the learners, the following are the competencies that should be mastered by learners/trainees after finishing this module.

LO 1. Operate CAD software and computer hardware; and

LO 2. Prepare plan using CAD.

## **I. Introduction**

The primary purpose of Technical Drafting is to provide the learners with the knowledge and skills that will help them become successful Draftsmen.

Preparing drawings using Computer-Aided Design (CAD) is designed to develop the technical skills and technical know-how of the learners in architectural drafting works using CAD. Learners will learn to operate CAD software and hardware, work on the basic drawing tools, in preparation for the architectural working plans and drawings. Thus, this module seeks to provide learners with the knowledge, skills, and motivation on how to prepare drawings/plans using computer-aided design in the field of Technical Drafting.

Orient learners on the following:

- Technology and Livelihood Education Curriculum
- Parts of the Module
- How to Use the Module

## **II. Objectives**

Guided by the teacher and this module, the learner is expected to know the skills and underlying principles in the process and delivery of Technical Drafting such as:

- discussion of the relevance of the course;
- explanation of key concepts relative to the course; and
- exploration of career opportunities.

## **III. Pre/Post Assessment**

Guide learners in assessing their knowledge and skill in Technical Drafting using:

- Paper and pencil test
- Performance test
- Computer for hands-on

Check their answers using the answer key.



#### **IV. Learning Goals and Targets**

Based on the objectives of the lesson and results of the pre-assessment, let the learners define their personal goals and targets to be achieved at the end of this module. Ask the learners to write their goals/targets in their notebooks/ answer sheets.

- Discuss the use and relevance of goal-setting and targets on their mini-course.
- Assist/guide learners in accomplishing their goals and targets using the format provided in the module.

#### **V. Process and Delivery**

##### **A. Know**

##### **Lesson 1: Operate CAD Software and Computer Hardware**

- Guide learners in answering the skills assessment on page 38 and 39 to assess prior knowledge in preparing computer-aided drawing.
- Guide learners to familiarize themselves with the basic elements of computer system.
- Show to class video clips of computer hardware and software.
- Let learners identify the compatible hardware for the software.
- Explain to the learners the importance of proper use of computer hardware.
- Demonstrate how to operate application software.
- Discuss to the learner the CAD system.
- Explain to the learners AutoCAD coordinate systems thoroughly.
- Explain to the learners the basic drawing tools used in CAD.
- Guide learners in the operation of the different commands in CAD.
- Discuss to the learners thoroughly CAD common function keys and special key functions.
- Explain to the learners the proper work habits/values in the workplace.

##### **Lesson 2: Prepare Plan using CAD**

- Discuss to the learners the importance of setting-up CAD to make the drafting environment appropriate for architectural drafting conventions.
- Explain the significance of a template file in using CAD.
- Demonstrate the procedures in creating a template file in CAD.
- Explain to the learners the importance of layer in CAD.
- Demonstrate to the learners in creating a layer.
- Discuss to the learners how to create layout of boarder and title block.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station

or workplace.

## ***B. Process***

### **Lesson 1: Operate CAD Software and Computer Hardware**

- Guide learners in performing simple activities in manipulating different CAD commands from page 55 up to page 81.
- Instruct learners to do the suggested activity 1 (A, B, C) on page 83 to 84.
- Provide additional sample related activities to enrich their knowledge on the topic.
- Check learners' answers using the given criteria and/or answer key.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

### **Lesson 2: Prepare Plan using CAD**

- Guide learners in performing suggested activity 1 (A and B) on pages 89 to 91.
- Check learners' answer using the given answers key.
- Provide additional sample related activities to enhance their skills on the proper use of drawing tools/commands.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

## ***C. Reflect and Understand***

### **Lesson 1: Operate CAD Software and Computer Hardware**

- Instruct learners to perform the suggested Activity 2 on page 84.
- Provide additional sample related activities (road signs) to deepen their understanding on the proper use of drawing tools/commands.
- Provide related video clips to enrich understanding of CAD software.
- Evaluate learners' performance using the given Performance Scoring Rubrics.

### **Lesson 2: Prepare Plan using CAD**

- Instruct learners to perform the suggested activity 3 on page 106.
- Provide additional activities to deepen their understanding of this topic.
- Provide related video clips to enrich their understanding of the topic.

- Evaluate learners' performance using the given Performance Scoring Rubrics.

#### ***D. Transfer***

##### **Lesson 1: Operate CAD Software and Computer Hardware**

- Instruct learners to perform summative assessment in suggested activity 3 on pages 85 to 86.
- Provide additional related activities to assess the learners' acquisition of knowledge and skills in CAD.
- Use the given scoring rubrics to assess the learners' performance.

##### **Lesson 2: Prepare Plan using CAD**

- Instruct learners to perform summative assessment in suggested activities 4 and 5 on page 108.
- Provide additional related activities to assess the learners' acquisition of knowledge and skills in CAD.
- Use the given scoring rubrics to assess the learners' performance.

## V. SUMMARY

This Technical Drafting course introduces to the learners the different learning activities that will prepare them to be skillful before they take the plunge into the world of work as draftsmen. All the basic and fundamental knowledge as well as the primary skills that a draftsman should acquire in order to produce marketable product/service which is one of the goals of entrepreneurship.

Lessons 1 covers the basics of CAD commands that will able to prepare and be familiar with the operation of CAD software and computer hardware. Suggested activities are also provided to enhance your skills in preparation of architectural requirements using CAD.

Lesson 2 discussed setting-up AutoCAD to work with architectural drafting style. Using CAD software as a drafting tool for architectural drawings conventions requires some changes.

In Technical Drafting and other field or similar areas, occupational health and safety precautions are applied in order for the worker to be safe and free from any hazards that would affect the equipment, the environment, as well as the people in a workplace.

The preparation of technical working drawings is not an easy task. This module would help the reader acquire the basic knowledge of and skill in this field.

## VI. FEEDBACK

### Pre-Assessment/Post-Assessment:

1. D
2. D
3. B
4. B
5. C
6. C
7. C
8. A
9. B
10. D
11. C
12. D
13. D
14. C
15. D
16. D

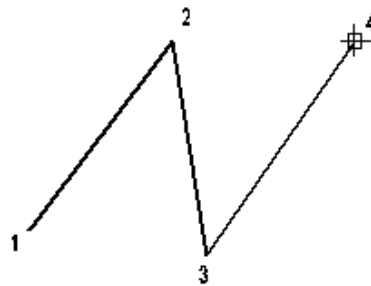
17.D  
18.C  
19.C  
20.B

LO 1. Process (Activity 2); page 51

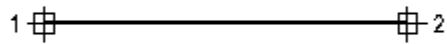
- A. 1. Application Menu
2. Quick Access Toolbar
3. Info Center
4. Title Bar
5. Ribbon
6. Drawing Area
7. Crosshair
8. Command Window
9. Status Bar

LO 1. Reflect and Understand (Activity 2); pages 52 to 72.

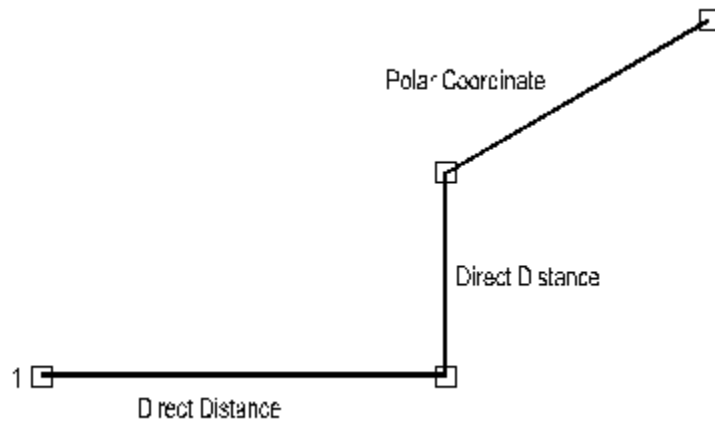
A. Command: LINE (By Picking):



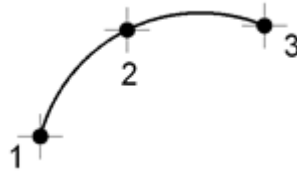
B. Command: LINE (By Direct Distance Entry):



C. Command: PLINE (By Direct Distance Entry and Polar Coordinate):



D. Command: ARC



LO 2. Process (Suggested Activity 1); page 78

- A.
  - 1. M
  - 2. SPL
  - 3. CO
  - 4. O
  - 5. PLINE
  - 6. DO
  - 7. POL
  - 8. SN
  - 9. RO
  - 10. EL
  - 11. SC
  - 12. S
  - 13. F
  - 14. A
  - 15. E
  - 16. C
  - 17. TR
  - 18. EX
  - 19. CHA
  - 20. AR
  
- B.
  - 1. Polygon
  - 2. Offset
  - 3. Rotate
  - 4. Mirror
  - 5. Array
  - 6. Line
  - 7. Erase
  - 8. Scale
  - 9. Trim

LO 1. Summative Assessment (Suggested Activity 4); [page 73](#); Teacher to check the finished output using performance rubrics.

LO 2. Summative Assessment (Suggested [Activity 2](#)); [page 90](#); Teacher to check the finished output using performance rubrics.

## VII. GLOSSARY

The purpose of the glossary is to guide learners like you with the technical terms and their operational meanings. This is a very useful component of the module that provides learners an access to a working vocabulary or meanings of the terms and phrases that relate with topics and/or concepts being discussed. The glossary also serves as additional reference material that will guide learner's in practicing the skills and correct them as well, when misconception arises.

## VIII. REFERENCES

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K to12 BASIC EDUCATION CURRICULUM  
 Information and Communications Technology  
**TECHNICAL DRAFTING**  
 Grade 10

**Module 4: Drafting Structural Layout and Details using Computer-Aided Design (CAD)**

**Quarter III**

**12 hrs.**

|   |
|---|
| <b>Grade Level Standard</b>   |
| <p style="text-align: center;">This module is on ICT-TD Drafting Structural Layout and Details using Computer-Aided Design (CAD).</p> <p style="text-align: center;">This focuses on <i>Process and Delivery</i> that is enriched with hands-on activities to assess learners’ level of knowledge and skills. Learning procedures are divided into different sections such as: What to Know, What to Process, What to Reflect on and Understand, and What to Transfer.</p>  |
| <b>Content Standard</b>   |
| <p>The learner demonstrates understanding of key concepts and underlying principles in the preparation of structural layout and details using CAD.</p>  |
| <b>Performance Standard</b>   |
| <p>The learner independently prepares structural layout and details using CAD based on established industry and/or job requirements.</p>  |
| <b>Learning Competencies</b>  |
| <p style="text-align: center;">The competencies expressed as learning outcomes in this teaching guide are aligned with the competencies that will be used to assess the learners/trainees for them to secure COC or NC in Technical Drafting.</p> <p style="text-align: center;">This teaching guide would allow you to strategically teach the competencies spread out in the module; guide the learners in performing the activities; process learner’s understanding; and assist the learners in applying what they have learned to an entirely new context.</p> <p style="text-align: center;">Utilizing effective teaching methodology and strategies suitable to the learning needs and requirements of the learners, the following are the competencies that should be mastered by learners’ trainees after finishing this module:</p> |

LO 1. Draft Foundation Plans using CAD; and

LO 2. Draft Structural Floors and Roof Framing Plans using CAD.

## **I. Introduction**

The primary purpose of Technical Drafting is to provide the learners with the knowledge of and skills that will help them become successful Draftsmen.

Structural Layout and Detail Drawings is designed to develop the technical skills and technical know-how of learners in structural drafting works using CAD. Learners will learn to interpret and fully understand the concepts of and principles in drafting structural layouts and details in working plans and drawings. Thus, this module seeks to provide them with the knowledge, skills, and motivation on how to draft structural layouts and details using CAD following the job requirements in the field of Technical Drafting.

Orient learners on the following:

- Technology and Livelihood Education Curriculum
- Parts of the Module
- How to Use the Module

## **II. Objectives**

Guided by the teacher and this module, the learner is expected to know the skills and underlying principles in the process and delivery of Technical Drafting using CAD such as:

- discussion of the relevance of the course;
- explanation of key concepts relative to the course; and
- exploration of career opportunities.

## **III. Pre/Post Assessment**

Guide learners in assessing their knowledge and skill in Technical Drafting using:

- Paper and pencil test
- Performance test
- Computers for hands-on

Check their answers using the answer key.

## IV. Learning Goals and Targets

Based on the objectives of the lesson and results of the pre-assessment, let learners define their personal goals and targets to be achieved at the end of this module. Ask learners to write their goals/targets in their notebooks on their answer sheets.

- Discuss the use and relevance of goal-setting/target-setting for the mini-course.
- Assist/guide learners in accomplishing their goals and targets using the format provided in the module.

## V. Process and Delivery

### A. *Know*

#### Lesson 1: Draft Foundation Plans

- Guide learners in answering the skills assessment on page 120 to assess prior knowledge of drafting floor and foundation plans.
- Ask the learners their understanding on the different technical terms on pages 122 to 123.
- Discuss thoroughly the steps in drawing foundation plan using CAD on page 124.
- Guide learners on the selection of appropriate CAD tool/command for drawing foundation plans.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

#### Lesson 2: Draft Structural Floors and Roof Framing Plans

- Discuss to the learners drafting structural floors plans using CAD.
- Explain thoroughly the sequence for drawing structural floor plans in CAD.
- Explain to the learners the significance of using CAD in floor framing plans.
- Discuss thoroughly to the learners drafting roof framing plans using CAD.
- Guide learners on the best practices in drafting structural floors and roof framing plans that must be observed in the work station or workplace.
- Guide learners on the proper work habits/values in the workplace.

### B. *Process*

#### Lesson 1: Draft Foundation Plans

- Instruct learners to do the suggested activity 1 on page125.
- Guide learners in performing the suggested activity and check the appropriateness of the CAD tool/command used.
- Instruct learners to perform the suggested activity 2 on page135.
- Provide similar activities for skills enrichment on the part of the learner.
- Check their answers using the given assessment tool (Performance Rubrics).
- Guide learners on the proper work habits/values in the workplace.

## **Lesson 2: Draft Structural Floors and Roof Framing Plans**

### Task 1 – Structural Floor Plan

- Task the learner to do the suggested activity 1 on page 133.
- Evaluate their answers using the suggested performance rubrics.
- Guide learners on the proper work habits/values in the workplace.

### Task 2 – Roof Framing Plan

- Let learners do the suggested activity 2 on page 135.
- Evaluate their answers using the given performance rubrics.
- Guide learners on the proper work habits/values in the workplace.

## ***C. Reflect and Understand***

### **Lesson 1: Draft Foundation Plans**

- To enhanced skills in using appropriate CAD tools/commands, task learners to perform suggested activity 2 on page 126.
- Guide learners in performing the suggested activity and check the appropriateness of the CAD tool/command used.
- Provide additional activities to deepen their understanding of the topic.
- Present related video clips to enrich understanding of the topic.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

### **Lesson 2: Draft Structural Floors and Roof Framing Plans**

- Show video presentations related topics to the class. Encourage learners to discuss insights generated from the video presentation.
- Let learners present their honest observation, comments, and feedback.
- Instruct learners to perform suggested activity 3 on page 136 to enhance their skills in drawing using CAD.

- Evaluate their output using the suggested performance rubrics.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

#### ***D. Transfer***

##### **Lesson 1: Draft Foundation Plans**

- Instruct learners to perform suggested activity 3 on page 127.
- Use the scoring rubrics to rate learners' performance.
- Instruct learners to perform the summative assessment on page 128 to determine the mastery of using the various tools/commands in drawing using CAD.
- Provide additional activities to assess the acquired knowledge of and skills of the learners on this topic.
- Guide learners on the best practices in drafting foundation plans that must be observed in the work station or workplace.
- Guide learners on the proper work habits/values in the workplace.

##### **Lesson 2: Draft Structural Floors and Roof Framing Plans**

- Assist the learners converting English system of measurements to Metric system if required in performing suggested activity 4 on pages 136 to 137.
- Guide learners in performing also the suggested activity 4 on page 136 to 137.
- Instruct learners to perform the summative assessment in Lesson 2 on pages 137 to 138 to assess the acquisition of knowledge and skills in using CAD tools/commands.
- Use the suggested scoring rubrics to rate learners' performance.
- Guide learners on the best practices in drafting structural floors and roof framing plans that must be observed in the work station or workplace.
- Guide learners on the proper work habits/values in the workplace.

#### **V. SUMMARY**

This course, Technical Drafting, introduces the learners to the different learning activities that will prepare them to be skillful before they take the plunge into the world of work as draftsmen. All the basic and fundamental knowledge of are discussed in each lesson as well the primary skills that a draftsman should acquire in order to produce marketable product/service which is one of the goals of entrepreneurship.

Lesson 1 covers drafting foundation plans. It is important to select drawing tools/command, in accordance with the standard operating procedures in CAD.

Lesson 2 discuss the drafting of structural floors and roof framing plans with the use of Computer-Aided Drawing.

In Technical Drafting and other field or similar areas, occupational health and safety precautions are applied in order to be safe and free to avoid hazards that would affect the equipment, the environment, as well as the people in a workplace.

Preparation of technical working drawings is not an easy task. This module would help learners acquire the basic knowledge of and skill in this field using the CAD.

## VI. FEEDBACK

### Pre-Assessment/Post-Assessment:

|      |       |       |       |       |
|------|-------|-------|-------|-------|
| 1. A | 6. D  | 11. B | 16. C | 21. D |
| 2. D | 7. B  | 12. A | 17. B | 22. B |
| 3. B | 8. B  | 13. B | 18. D | 23. B |
| 4. C | 9. B  | 14. A | 19. B | 24. A |
| 5. C | 10. D | 15. B | 20. C | 25. C |

## VII. Glossary

The purpose of the glossary is to guide teachers and learners with the technical terms and their operational meanings. This is a very useful component of the module that provides learners an access to a working vocabulary or meanings of the terms and phrases that relate with topics and/or concepts being discussed. The glossary also serves as an additional reference material that will guide learner's in practising the skills and correcting them as well, when misconception arises.

## VIII. References

### Books and Articles and Printed Materials:

K to 12 Basic Education Curriculum- Technology and Livelihood Education  
Learning Module – Technical Drafting

Technical Drafting NCII – Drafting Electrical and Electronic Layout Details, Ruel Mercado

2D CAD Module, Technological University of the Philippines, College of Industrial Technology

Training Guide, Technological University of the Philippines, College of Industrial  
Technology, College of Architecture and Fine Arts

Technological Drawing 8<sup>th</sup> Edition, Frederick E. Giesecke, et al.,

K to12 BASIC EDUCATION CURRICULUM  
Information and Communications Technology  
**TECHNICAL DRAFTING**  
Grade 10

**Module 6: Drafting Sanitary and Plumbing Layout and Details using CAD**

**Quarter IV**

**16 hrs.**

**Grade Level Standard:**

Information and Communication Technology (ICT) is one of the four (4) components of Technology and Livelihood Education (TLE). One of the mini- courses offered is Technical Drafting. This mini-course covers Process and Delivery (PD) which consists of the core competencies that a Grade 10 learner ought to possess the necessary skills in drafting sanitary and plumbing layout and details.

**Content Standard**

The learner demonstrates understanding of concepts and underlying principles in drafting sanitary and plumbing layout and details.

**Performance Standard**

The learner independently drafts sanitary and plumbing layout and details following the job requirements

**Learning Competencies**

- draft water distribution system; and
- draft sanitary and storm drainage

**I. Introduction**

The primary purpose of Technical Drafting (TD) is to provide learners with the knowledge and skills that will help them become Draftsmen, Structural CAD Designer or a Drafting Technician.

Upon completion of this module, learners are expected to: (1) draft hot and cold water distribution systems; (2) indicate signs and symbols according to sanitary and plumbing requirements; (3) draw sewerage plan layout; (4) draft storm drainage; (5) draw details and symbols according to sanitary and plumbing requirements.

Orient learners on the following:

- Entrepreneurship-based technology and livelihood education curriculum
- Parts of the module
- How to use the module



## II. Objectives

Guided by the teacher and this module the learner is expected to know the skills and underlying principles in the process and delivery of Technical Drafting such as:

1. operational definitions/terminologies on electrical and electronic layout and details; and
2. details and symbols according to sanitary and plumbing requirements using CAD.

## III. Pre/Post Assessment

- ❖ Guide learners in assessing their knowledge and skills in Drafting Technology using:
  - Paper and pencil test
  - Performance test
  - Computer for hands-on
  - Check their answers using the answer key

## IV. Learning Goals and Targets

Based on the objectives of the lesson and results of the pre-assessment, let learners define their personal goals and targets to be achieved at the end of this module. Ask learners to write their goals/targets on their notebook/answer sheet.

- Discuss the use and relevance of setting goals and targets for the mini-course.
- Assist/Guide learners in accomplishing their goals and targets using the format provided in the module.

## V. Process and Delivery

### Lesson 1: Drafting Water Distribution Systems

#### A. Know

- Guide learners in answering the skills assessment on page 163 to assess prior knowledge of drafting sanitary and plumbing layout and details using computer-aided design (CAD).
- Let learners reflect on their target and identify which skills needs to be developed through a goal setting activity on page 164. Encourage them to specify their plan of action to achieve their target.
- Guide learners in creating design center AutoCAD blocks for pipe fittings.
- Demonstrate to the learners the application of CAD tools/commands in isometric drawing.

- Group learners according to similarities in skills to be developed. Use Module No. 6, Pose10 or more guide questions which may lead your students to discover important aspects of your lesson.
- Let learners work on an independent learning activity or an independent cooperative learning (ICL). Guide them while in progress for constructive inquiry to emphasize which points are most important.

## ***B. Process***

### **Task 1**

- Group learners to do some practical analysis using a pictures or prototypes of toolbar icons and tools then explain the concepts behind, on a class presentation.
- Guide learners in performing suggested activities 1 and 2 (process) on pages 166 and 167 of the module, respectively.
- Encourage learners for a class reporting.
- Guide learners in formulating their own rubric in assessing the quality of their report. It may be but not limited to communication skills, demonstration, and mastery.

## ***C. Reflect and Understand***

- Let learners perform the suggested activity 3 (reflect and understand) on page 168 emphasizing the job requirement.
- Provide constant checking of learners' while doing the activity.

## ***D. Transfer***

- Ask learners to accomplish the suggested activity 4 on page 169: Drafting Water Distribution System.
- The steps and illustrations to accomplish the task has already been provided for their guidance, make sure each step has been accurately done.
- You may employ reporting demonstration to from one of the groups to showcase the steps they are to accomplish.
- Formulate an assessment rubric with learners to let learners be informed of the areas/criteria where they will be rated accordingly on reporting and quality of outputs.
- Re-assess learners based on their goals and target set earlier, to serve as quality assure that they learned the skills expected from the lesson.

## **Lesson 2: Drafting Sanitary and Storm Drainage using CAD**

### ***A. Know***

- Let the students work on an independent learning activity or an independent cooperative learning (ICL). Guide them while in progress for constructive

inquiry to emphasize which points are most important.

- Conduct a lecturette/mini presentation to address learners' inquiry and/or clear doubts and difficulties in understanding concepts about the lesson.

### ***B. Process***

- Let learners accomplish the suggested activity 1 on page 170: Draft a Storm Drainage System.
- The steps and illustrations to accomplish the task has already been provided for their guidance, make sure each step has been accurately done.
- You may employ reporting demonstration to from one of the groups to showcase the steps they are to accomplish.
- Formulate an assessment rubric with learners to let learners be informed of the areas/criteria where they will be rated accordingly on reporting and quality of outputs.
- Re-assess learners based on their goals and target set earlier, to serve as quality assure that they learned the skills expected from the lesson.

### ***C. Reflect and Understand***

- Guide learners follow directions in performing suggested activity 2 on page 171.
- Turn learners focus on the application of AutoCAD tools in creating a floor drain system and the steps they need to follow to accomplish the required output.
- Self-passed assessment may be done to ensure individualized learning, where fast learner students may go to the next level of the activity not hindered by challenged students.

### ***D. Transfer***

- Assist learners in performing the suggested activity 3 on page 171.
- Use an assortment of floor plans for group work and let learners simulate creatively how they would be able to apply plumbing layout and details that follow the job requirement.

## **V. SUMMARY**

Drafting sanitary and plumbing layout and details lets learners become creative and practical in providing efficient water distribution system that minimizes plumbing requirements between the water source and destination. Design considerations include centrally located water heat sources, water need areas close together, and central manifold or recirculating plumbing systems. These design options reduce the time needed for hot water to appear at the faucet, the amount of water wasted waiting for hot water, and the amount of energy lost in transition.

## VI. FEEDBACK

### Pre-assessment/ Post- assessment

Multiple Choice:

- |      |      |       |
|------|------|-------|
| 1. b | 6. a | 11. a |
| 2. a | 7. a | 12. a |
| 3. a | 8. b | 13. a |
| 4. b | 9. c | 14. c |
| 5. c | 10.a | 15. d |

## VII. GLOSSARY

The purpose of the glossary is to guide the teachers and learners with the technical terms and their operational meanings. This is a very useful component of the module that provides learners an access to a working vocabulary or meanings of the terms and phrases that relate with topics and/or concepts being discussed. The glossary also serves as an additional reference material that will guide learners in practising the skills and correcting them as well, when misconception arises.

## VIII. REFERENCES

### Books and Articles and Printed Materials:

1. Plumbing Plans, Chapter 20, Architectural Drafting and Design
2. UNIVERSITY OF WASHINGTON, Mechanical Facilities Services Design Guide
3. Thermal Process and Mild Steel Pipework Unit 5: Drawing Phase 2, Module 1

K to12 BASIC EDUCATION CURRICULUM  
Information and Communications Technology  
**TECHNICAL DRAFTING**  
Grade 10

**Module 7: Drafting Mechanical Layout and Details using CAD**

**Quarter IV**

**24 hrs.**

**Grade Level Standard:**

Information and Communication Technology (ICT) is one of the four (4) components of Technology and Livelihood Education (TLE). One of the mini-courses offered is Technical Drafting. This mini-course covers Process and Delivery (PD) which is consist of the core competencies that a Grade 10 learner ought to possess the skills in drafting mechanical layout and details.

**Content Standard**

The learner demonstrates understanding of concepts and underlying principles in drafting mechanical layout and details using CAD.

**Performance Standard**

The learner independently drafts mechanical layout and details following the job requirements.

**Learning Competencies**

- draft heating, ventilating and air-conditioning systems layout;
- draft mechanical details of conveyor systems; and
- draft fire protection systems using CAD

**I. Introduction**

The primary purpose of Technical Drafting (TD) is to provide learners with the knowledge and skills that will help them become Draftsmen or a Drafting Technician.

Upon completion of this module, learners are expected to: (1) draft heating, ventilating and air-conditioning systems according to Mechanical Code; (2) indicate signs and symbols according to mechanical layout and detail requirements; (3) layout/draw elevator, escalators, dumbwaiters and moving ramp systems according to the Mechanical Code; (4) draw details of mechanical conveyor system according to the mechanical layout and detail requirements; (5) draws fire sprinkler plan according to Fire Code; (6) draw signs and symbols of fire protection systems according to fire protection requirements.

Orient learners on the following:

- Entrepreneurship-based technology and livelihood education

- curriculum
- Parts of the module
- How to use the module

## II. Objectives

Guided by the teacher and this module the learner is expected to know the skills and underlying principles in the process and delivery of Technical Drafting such as:

1. operational definitions/terminologies on mechanical layout and details in CAD application; and
2. details and symbols according to mechanical layout and details requirements in CAD

## III. Pre/Post Assessment

- ❖ Guide learners in assessing their knowledge and skills in Drafting Technology using:
  - Paper and pencil test
  - Performance test
  - Computer for hands-on
  - Check their answers using the answer key

## IV. Learning Goals and Targets

Based on the objectives of the lesson and results of the pre-assessment, let learners define their personal goals and targets to be achieved at the end of this module. Ask learners to write their goals/targets in their notebook on their answer sheets.

- Discuss the use and relevance of goal-setting and targets for the mini- course.
- Assist/guide learners in accomplishing their goals and targets using the format provided in the module.

## V. Process and Delivery

### A. Know

#### Lesson 1: Drafting Heating, Ventilating, and Air-Conditioning Systems Layout using CAD

- Guide learners in answering the skills assessment on page 178 to assess prior knowledge in drafting mechanical layout and details.
- Explain thoroughly drafting, ventilating and air-conditioning (HVAC) systems using CAD.

- Discuss to the learners the proper selection of CAD tools/commands in creating AutoCAD library for mechanical layout and details.
- Let learners familiarize themselves with the names and CADD Layers used in HVAC Drawings, the students should be able to input the layers in AutoCAD for HVAC Applications.

### **Lesson 2: Drafting Mechanical Details of Conveyor Systems using CAD**

- Discuss to the class the CAD tools/commands in drafting mechanical details of conveyor systems.
- Group learners according to similarities in skills to be developed. Use module drawings to pose 10 or more guide questions which may lead learners to discover important aspects of the lesson.
- Let learners work on an independent learning activity or an independent cooperative learning (ICL). Guide them while in progress for constructive inquiry to emphasize which points are most important.

### ***B. Process***

#### **Lesson 1: Drafting Heating, Ventilating, and Air-Conditioning Systems Layout using CAD**

- Guide the learners in performing the suggested activity 1 on page 184.
- Checking of the answer in suggested activity 1 will be provided by the teacher.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

#### **Lesson 2: Drafting Mechanical Details of Conveyor Systems using CAD**

- Assist learners in performing suggested activity 1 on page 187.
- Evaluate their answers using the given performance rubrics.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

### ***C. Reflect and Understand***

#### **Lesson 1: Drafting Heating, Ventilating, and Air-Conditioning Systems Layout using CAD**

- Assist the learners in performing the suggested activity 2 on page 185.
- Evaluate their answers using the given performance rubrics.
- Provide additional activities to deepen their understanding of the topic.
- Present related video clips to enrich understanding of the topic.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

#### **Lesson 2: Drafting Mechanical Details of Conveyor Systems using CAD**

- Guide the learners in performing suggested activity 2 on page 187.
- Evaluate their answers using the given performance rubrics.
- Provide additional activities to deepen their understanding of the topic.
- Present related video clips to enrich understanding of the topic.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

### ***D. Transfer***

#### **Lesson 1: Drafting Heating, Ventilating, and Air-Conditioning Systems Layout using CAD**

- Guide the learners in performing suggested activity 3 on page 186.
- Evaluate their answers using the given performance rubrics.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

#### **Lesson 2: Drafting Mechanical Details of Conveyor Systems using CAD**

- Assist the learners in performing suggested activity 3 on page 189.
- Evaluate their answers using the given performance rubrics.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.



## ***A. Know***

### **Lesson 3: Drafting Fire Protection System using CAD**

- Discuss to the learners Fire Protection System in buildings.
- Explain thoroughly to the learners the requirements for safety in residential/buildings.

## ***B. Process***

### **Lesson 3: Drafting Fire Protection System using CAD**

- Guide the learners how to create AutoCAD blocks for Fire Safety Symbols in suggested activity 1 on page 191.
- Evaluate their answers using the given performance rubrics.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

## ***C. Reflect and Understand***

### **Lesson 3: Drafting Fire Protection System using CAD**

- Assist the learners in performing the suggested activity 2 on page 191.
- Evaluate their answers using the given performance rubrics.
- Provide additional activities to deepen their understanding of the topic.
- Present related video clips to enrich understanding of the topic.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

## ***D. Transfer***

### **Lesson 3: Drafting Fire Protection System using CAD**

- Assist the learners in performing suggested activity 3 on page 192.
- Evaluate their answers using the given performance rubrics.
- Guide learners on the proper work habits/values in the workplace.
- Guide learners on the best practices that must be observed in the work station or workplace.

## **V. SUMMARY**

At this part of technical drafting course, learners use a schematic design for a given project that used by all design professionals (architects, engineers,

interior designers) in the preparation of construction documents for the project. The purpose of this is to assure a maximum quality and value in construction projects through uniformity, system or component quality, compatibility, sustainability, functionality, and ease of maintenance.

Drafting mechanical layout and details provides general direction to design professionals as a general rule for most circumstances. With the wide variety of facilities, varying life expectancies and program requirements, all these have to be specifically and correctly applied to each project by the design professionals.

## **VI. FEEDBACK**

### **Pre-assessment/ Post- assessment**

#### Multiple Choice

- |      |       |
|------|-------|
| 1. a | 6. a  |
| 2. c | 7. d  |
| 3. b | 8. b  |
| 4. b | 9. a  |
| 5. c | 10. c |

## **VII. GLOSSARY**

The purpose of the glossary is to guide the teachers and learners with the technical terms and the operational meaning of these. This is a very useful component of the module that provides learners an access to a working vocabulary or meanings of the terms and phrases that relate with topics and/or concepts being discussed. The glossary also serves as an additional reference material that will guide learners in practising the skills and correcting them as well, when misconception arises.

## **VIII. REFERENCES**

### **Books and Articles and Printed Materials:**

1. HVAC Designs, Inc. // Collection Vol. 1
2. Plumbing Plans, Chapter 20, Architectural Drafting and Design
3. UNIVERSITY OF WASHINGTON, Mechanical Facilities Services Design Guide.
4. Thermal Process and Mild Steel Pipework Unit 5: Drawing Phase 2, Module 1.