

Textbook Development and Use Manual

1st Draft: Wed. 6 Oct. 2021

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1. Objectives

- To develop practice-oriented textbooks according to the educational philosophy and objectives of Ethiopian Technology University (ETU).
- To develop practice-oriented textbooks in the right process and consistency.
- To develop practice-oriented textbooks for right teaching and learning with appropriate practice considering the level of students and experiment and practice environment.

2. Procedure and Job Description

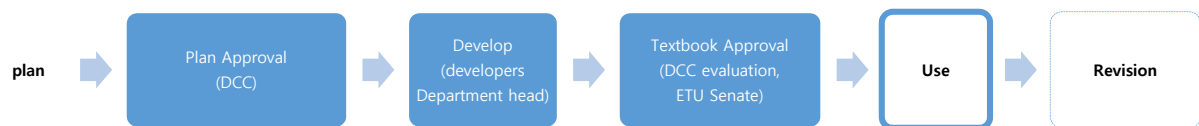


Figure 1. Procedure for textbook development and use.

2.1. Before developing textbooks

- 1) **Textbook Development Plan: Department head** should prepare textbook development plan, where course titles and developers should be specified. For textbook development plan, see **appendix A**.
- 2) **Department Curriculum Committee (DCC)** should review and approve textbook development plan considering all the needs from inside and outside of ETU and industry.

2.2. During developing textbooks

- 1) **Textbook Development Management: Department head** should manage all the process to develop right textbooks based on textbook development plan and this textbook development and use manual.
- 2) **Textbook development workshops** should be held to make textbook developers familiar with textbook development and use manual and to review and evaluate the developed textbooks.
- 3) **Developers** should develop their textbooks within the due date based on the text development plan and this textbook development and use manual.

2.3. After developing textbooks

- 1) **Review and Evaluation: Department Curriculum Committee** should review and evaluate the developed textbooks and decide to accept them. For review and evaluation, see **appendix B**.
- 2) **Textbook Approval: ETU Senate** should finally evaluate the developed textbooks and proceed the **university approval process**.
- 3) **Use:** The finally approved textbooks should be used in the very next semester. Department head should check the use of the developed textbooks, and monitor students' responses and the problems of the developed textbooks in use.
- 4) **Revision:** To upgrade the developed textbook including modification of errors and minor changes, there can be revision processes. The revised textbooks should be reported to Department Curriculum Committee.

3. Schedule and Outputs

- Schedule (modified)

Phase	Develop	Approval & Print	Use
1 st 6 Textbooks	Q2/2022 – Q4/2022	Q1/2023	Q2/2022 ~
2 nd 6 Textbooks	Q2/2023 ~ Q4/2023	Q1/2024	Q2/2024 ~
3 rd 6 Textbooks	Q2/2024 ~ Q4/2024	Q1/2025	Q2/2025 ~

- Outputs are printed textbooks of the developed textbooks and their Microsoft Word and PDF files.

4. Development and Use Strategy

- **Course Selection Guideline:** Major and practice included courses should first be developed according to the purpose of practice-oriented.
Considering the situation of the department, common major and practice included courses can be prioritized.
Department head can change the priority by reflecting the urgent needs from inside and outside of ETU and industry.
- **Department Curriculum Committee:** Department head becomes the chairman. A leading Korean experts become the co-chairman.
The committee members become department faculties considering the fields of the department and Korean experts.
To reflect the needs of the industry, one or more industrial committee members are appointed.

The **industry committee members** should have enough knowledge and experience in the department fields and right understanding of the department curriculum. (The best candidates for industry committee members are the senior manager level among graduates of the department.)

- **Developers:** Considering the purpose of practice-oriented textbook development, department faculties who know the students' tendencies and practice environment of the department can become developers.
Outside experts can join as co-developers.
- **Textbook:** The developed textbook will be used as teaching material in both theory and practice classes of the corresponding course. Therefore the developed textbook should consist of weekly based theory, practice and appropriate evaluation (assessment) in consideration of the department's environment and practice equipment.
Considering the short development period, ease of writing and consistency, **textbook editing** is made as simple as possible.
For **copyright protection**, all cited texts, figures, pictures, tables, and etc. must be indexed with right references (including websites).
- **Use:** The developed textbooks will only be used for students' education in ETU and its affiliated organizations.

5. Textbook Editing

- **Formation:** Front cover, inner cover, (acknowledgement),
Contents (1~2 pages),
Body: Course Profile with Detail Course Outline
Chapters and Sessions (Theory, Weekly Practice and Assessment),
References
(Appendix,)
Back cover.
- **Word processor:** Microsoft Office Word
- **Page size:** A4
- **Page margin:** default margin
- **Font:** Times New Roman (only)
- **Line spacing:** 1.15 (or 1.5)
- **Numbering and Font Sizing:** (Numbering: No indentation)
 - Chapter: **1. Chapter Title** (font size 20, bold)
 - Session: **1. Session Title** (font size 18, bold)
 - Sub-session: **1.1 Sub-session Title** (font size 16, bold)

Topic: **1)** or **No numbering** (font size 14, bold)

Sub-topic: **•** or **No marking** (font size 12, bold)

Body text: No numbering and No marking (font size 12, plain)

- **Caption:** Table caption is above the table. Example) Table 1-1. Table description.
Figure caption is below the figure. Example) Figure 1-1. Figure description.

- **Reference:** [1] Authors, Paper Title, *Book Title*, referencing pages, Press, Publication Year.
[2] <https://www.XXXXXX.XX/XXXX.html>

6. Template or Sample for Textbook Editing

- For textbook sample and template, see **Appendix C** or refer to the file “**Textbook Sample and Template.docx**.”

Textbook Development Plan

Department: _____

Reporter: _____

Date: _____

1. Objective

- Practice-oriented textbook development
- Teaching guideline development based on the developed textbook

2. Course selection guideline

- Major course, practice course first
- Manly developed by corresponding ETU faculty members not outside experts
- Outside experts can join as co-developers

3. Textbook development plan

Phase	No	Course Name	Developer Name	Co-developer/Affiliation
1	1			
	2			
	3			
	4			
	5			
	6			
2	1			
	2			
	3			
	4			
	5			
	6			
3	1			
	2			
	3			
	4			
	5			
	6			

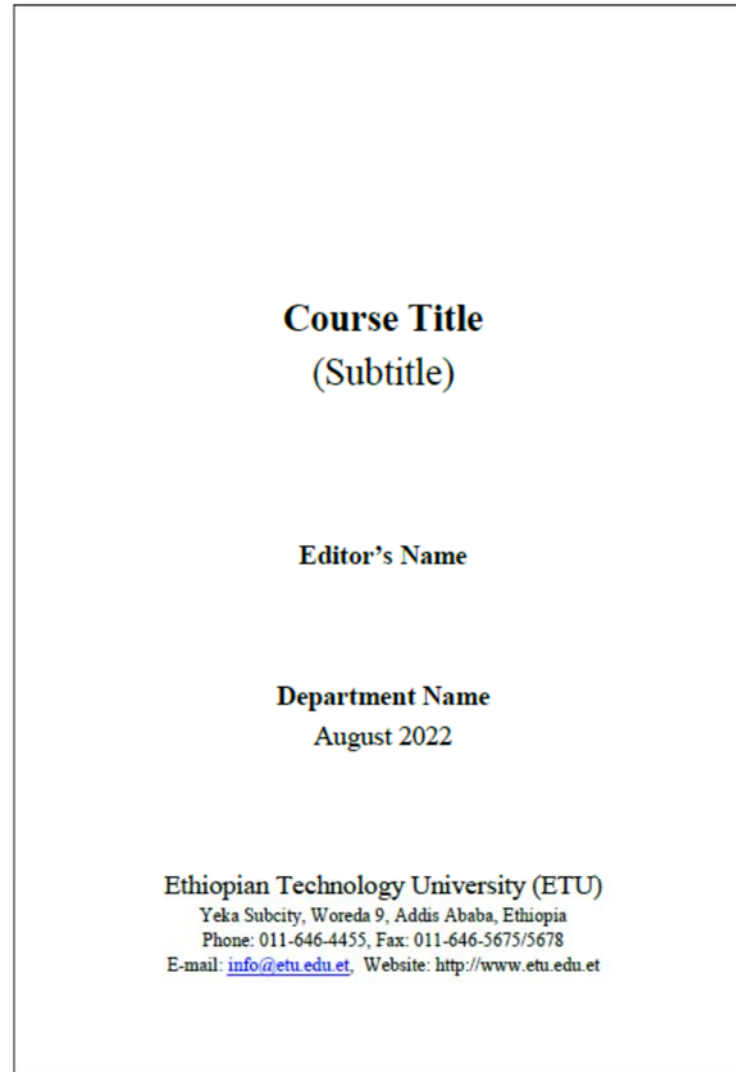
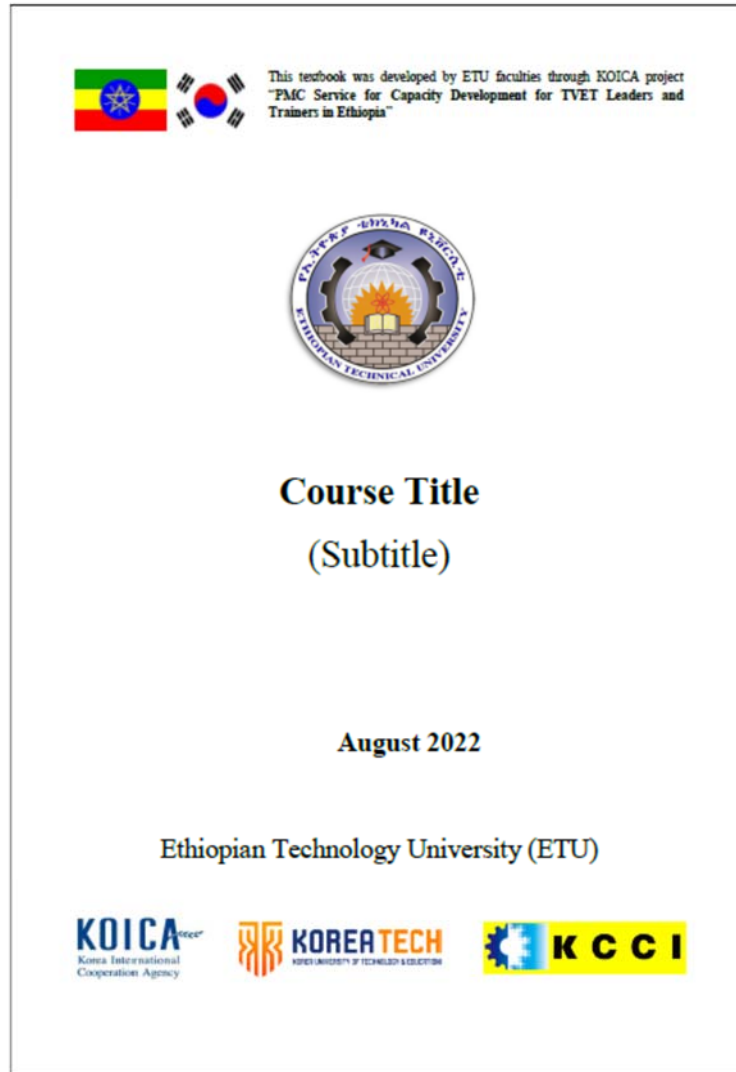
Textbook Review and Evaluation

Reviewer: _____

Date: _____

Evaluation Classification and Contents	5-Point Rating					Score
	Strongly Disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly Agree (5)	
1. Correlation with the Curriculum						
1-1. It is consistently structured according to the curriculum?						
1-2. It is organically related to textbooks at a higher or lower level?						
1-3. Learning objectives are clearly presented?						
1-4. The step-by-step and detailed curriculum is specifically reflected?						
2. Learning Contents						
2-1. The learning goal is specifically presented in each unit?						
2-2. The learning contents reflect the learner's level?						
2-3. The learning contents are systematically organized?						
2-4. The learning contents are specifically and accurately described?						
2-5. The tasks according to the stages and procedures of learning activities are described in detail?						
2-6. It is inducing learners' interest and participation?						
3. Textbook Format						
3-1. The format of textbook is appropriate to achieve educational goals?						
3-2. The amount of textbook is appropriate?						
3-3. Appropriate means of expression (figures, photos, tables, and etc.) are used?						
3-4. The sentence is natural and there's no typo?						
3-5. It is edited in a readable way?						
3-6. Auxiliary materials or reference materials are presented?						
4. Evaluation and Feedback						
4-1. The goals and criteria of the evaluation are clearly presented?						
4-2. The contents and methods of the evaluation are presented in detail?						
4-3. The detailed items of the evaluation are presented according to the educational goals?						
4-4. It is presenting practice questions and practice questions for the learner's self-inspection						
Total Score						
Comment:						

Appendix C. Textbook Sample and Template



CONTENTS

Course Profile	.....	X
Chapter 1: Chapter Title	.....	X
1. Session Title	.....	X
2. Session Title	.....	XX
3. Week 1 Practice	.....	XX
4. Week 2 Practice	.....	XX
Chapter 2: Chapter Title	.....	XX
1. Session Title	.....	X
2. Session Title	.....	XX
3. Week 1 Practice	.....	XX
4. Week 2 Practice	.....	XX
:		
:		
References	.....	XXX
Appendix	.....	XXX

Course Profile

Department	
Course title	Course Title
Course description	<ul style="list-style-type: none">• Course description is here
Course objective	<ul style="list-style-type: none">• Course objective 1• Course objective 2:
Learning outcomes	<ul style="list-style-type: none">••
Pre-requisite	<ul style="list-style-type: none">•
Target group	<ul style="list-style-type: none">•

Detail Course Outline

Week	Topics to be covered (2 lecture hours)	Topics to be covered (3 lab hours)	Outcomes	Required materials /equipment/devices
Chapter One:				
1	Introduction to computer networks1 (Internet, LAN, WIFI, WAN, Mobile Network, TP, Optical Cable, Wireless)	• Campus network site tour	1.1	-
2	Introduction to computer networks2 (Protocol, TCP/IP, OSI, MAC address, IP address)	• Search MAC address, IP address of my PC • Search Internet protocols as much as possible	1.2 1.3	PC, Internet
Chapter Two:				
3	Network applications (client-server application, domain name, URL, web, email, DNS, SNS)	• Check Web browser-server communication (IP address, domain name, HTTP, HTTPS, URL) • Check Mail client-server communication (mail address, headlines, send, receive)	1.4	PC, Internet
4	Networking Cables (TP, Optical cables)	• UTP construction • PC-Switch connection by using the UTP constructed • Optical cable connection (if available)	2.1	PC, UTP construction tools, Switches
Chapter Three:				
5	Ethernet and Switch basics (History, Network topology, Transmission speed, MAC address vs. IP address, Switched network)	• Switch console and network port connection • Switch CLI access and execute simple commands	2.2	PC, Switches, Console cables
6				
7				
Chapter Four:				
8				
9		<i>Industry Visit to..... (if only applicable or demanding)</i>		
10				
11				
Chapter Five:				
12				
13				
14				
15				
16	Final Examination period.			

Chapter 1.

Introduction to Microprocessor

Lesson Plan

1. Learning objectives

- Be able to define microprocessor and microcontroller and its architecture
- Be able to classify microprocessor and microcontroller
- Be able to differentiate microprocessor and microcontroller
- BE able to install necessary software and driver able to create new project

2. Motivation

- Outputs through Question and Answer; repetitive discussion and instruction of the microprocessor and microcontroller and its architecture; individual internet search.

3. Expectations or Outcomes

- Define the terminologies, differentiate and explain architecture; the assessment standard attached at the end of the job task sheet.
- Can identify the application that can be solved by microcontroller system, assessment results.

4. Equipment

- Desktop or Laptop computer with internet connection.
- Microcontroller Training kit, USBasp Burner, USB-A to B
- AVR software (MikroC Pro for AVR)

5. Practice contents/Activities/Safety

- Brief introduction of microprocessor and microcontroller.
 - Active practice; it can increase learning effect including personal technical skill, but its efficiency decreases if too much time is allocated.
- Various types of microprocessor
 - On the basis of Size of data bus
 - On the basis of application
 - On the basis of architecture
- Difference between microprocessor and microcontroller
- Tool setup
- Always remind students of safety precautions.

6. Assessments

- Differentiate microprocessor and microcontroller.
- What does ALU stand for?
- How can you install usbasp driver?

7. Clean-up

- After finishing practice, all tools and equipment utilized in the practice shall be returned back to the proper storage place.
- Clean up the work bench and practice shop.

8. Independent practice/Follow-up activities

- Learning through assignment

9. Review/Reflection

- Review the outcome of the practice, improvement measure and previous reflected opinions.

1. Introduction

1.1 Microprocessor

A microprocessor is a multipurpose, programmable, clock-driven, register-based electronic device that reads binary instructions from a storage device called memory, accepts binary data as input and processes data according to those instructions, and provides results as output. It uses Von Neumann architecture where data and program present in the same memory module.

- Microprocessors are the most important parts of the computers. They act like the brain of the computer system.
- The speed and processing capacity of a computer can be measured by the processor capacity.

Nowadays, microprocessor can be seen in almost all types of electronics devices like mobile phones, printers, washing machines etc. Microprocessors are also used in advanced applications like radars,

A processor is the brain of a computer which basically consists of Arithmetical and Logical Unit (ALU), Control Unit and Register Array. As the name indicates ALU performs all arithmetic and logical operations on the data received from input devices or memory....

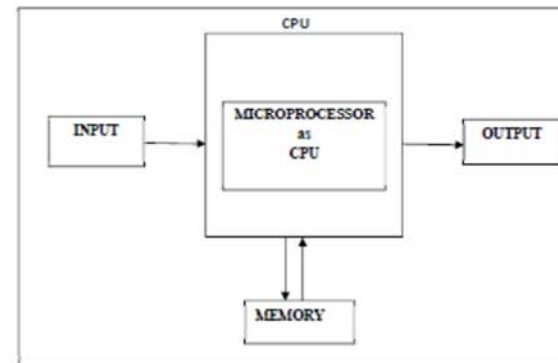


Figure 1.1. Block diagram of computer with microprocessor [1].

The semiconductor manufacturing technologies used for chips are:

- Transistor-Transistor Logic (TTL)
- Emitter Coupled Logic (ECL)

:

Classification of Microprocessors

Based on their specification, application and architecture microprocessors are classified as:

i. Based on size of data bus:

- 4-bit microprocessor
- 8-bit microprocessor

:

ii. Based on application

- General-purpose microprocessor- used in general computer system and can be used by programmer for any application. Examples, 8085 to Intel Pentium.
- Microcontroller- microprocessor with built-in memory and ports and can be programmed for any generic control application. Example, 8051.

:

Examples

- Intel 4004 – The First Microprocessor
- Intel 8085

:

1.2 Microcontroller

A microcontroller is a compact integrated circuit designed to govern a specific task in an embedded system

Features

- The main advantage of a CISC (complex instruction set computer) architecture, with which the modern microcontrollers are built, is the macro-type instructions. A macro instruction can be used in a program replacing a number of instructions.
- Latest microcontrollers are operated at lesser power consumption. Usually, they can support a working voltage of 1.8-5.5 V.

:

The basic structure of a microcontroller comprise of:

- CPU – Microcontrollers brain is named as CPU. CPU is the device which is employed to fetch data, decode it and at the end complete the assigned task successfully. With the help of CPU all the components of microcontroller is connected into a single system. Instruction fetched by the programmable memory is decoded by the CPU.
- Memory – In a microcontroller memory chip works same as microprocessor. Memory chip stores all programs & data. Microcontrollers are built with certain amount of ROM or RAM (EPROM, EEPROM, etc) or flash memory for the storage of program source codes.

Assessments

1. Practical

- Install necessary software necessary for AVR.

2. Theory

Objective Type Question

1. A microprocessor is a chip integrating all the functions of a CPU of a computer
 - a. Multiple
 - b. Single
 - c. Double
 - d. Triple

Answer: b

2. A microcontroller at-least should consist of:
 - a. RAM, ROM, I/O devices, serial and parallel ports and timers
 - b. CPU, RAM, I/O devices, serial and parallel ports and timers
 - c. CPU, RAM, ROM, I/O devices, serial and parallel ports and timers
 - d. CPU, ROM, I/O devices and timers

Answer: c

3. Abbreviate CISC and RISC.
 - a. Complete Instruction Set Computer, Reduced Instruction Set Computer
 - b. Complex Instruction Set Computer, Reduced Instruction Set Computer
 - c. Complex Instruction Set Computer, Reliable Instruction Set Computer
 - d. Complete Instruction Set Computer, Reliable Instruction Set Computer

Answer: b

4. What is the file extension that is loaded in a microcontroller for executing any instruction?
 - a. .doc
 - b. .c
 - c. .txt
 - d. .hex

Answer: d

5. What is the most appropriate criterion for choosing the right microcontroller of our choice?
 - a. Speed
 - b. Availability
 - c. Ease with the product
 - d. All of the mentioned

Answer: d

Subjective Type Question

1. How do you differentiate microprocessor and microcontroller?

2. Write two applications of microcontroller in the industry.

3. Write down the different types of microcontroller.

Evaluation Table:

Evaluation		Excellent	Good	Fair	Bad	Score	Remark
Result Evaluation	Working Principle	15~13	12~9	8~5	4~1		
	Install driver	15~13	12~9	8~5	4~1		
	Connection	10~9	8~6	5~3	2~1		
	Program output	10~9	8~6	5~3	2~1		
	Applications	10~9	8~6	5~3	2~1		
Work Evaluation	Tool Setup	20~18	17~12	11~7	6~1		
	Usage and storage of the tools and materials	5	4~3	2	1		
	Damage Status of the circuit board	5	4~3	2	1		
Time	Time used (180 Min.) (1 per 10 min.)	10~9	8~6	5~3	2~1		
Total		100~90	89~60	59~33	32~9		

< More Assessment Examples are to be added here. >

Reference

- [1] <https://lastminuteengineers.com/1293d-dc-motor-arduino-tutorial/#control-pins>
- [2] <https://www.electronicshub.org/dc-motor-control-arduino/>
- [3] <https://www.build-electronic-circuits.com/h-bridge/>



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