

**MULTIFUNCTIONAL VOCATIONAL EDUCATION(MVE)  
CURRICULUM FOR VOCATIONAL TECHNICAL DEPARTMENTS  
OF UNIVERSITIES  
(EXPERIENCES GAINED DURING A FOURTEEN YEARS  
TEACHING PERIOD IN SCHOOL OF COMPUTING AND  
TECHNOLOGY, EASTERN MEDITERRANEAN UNIVERSITY)**

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**Abstract**

Due to lack of high quality vocational school technology graduates, the industry demands such technicians urgently. After the solution of Cyprus problem the need for such well educated, high quality technology graduates will increase enormously and new technology education institutions have to be organized. Here I suggest an effective and economically feasible educational framework where the graduates from the MVE are fully proficient in an area and good in all the others. These eight areas are electronics, electrical installation, motor control and winding, computer hardware, microprocessors, construction, drawing and programming. The students will choose one of those eight areas and become expert in that area by the summer training and graduation project studies. The curriculum is suitable for both areas of the MVE and provides a wide range of educational choices which increases the chance of employment of graduates and gives a good chance to have their own businesses.

**Keywords:** MVE, vocational education, technology.

**1. INTRODUCTION**

Each sector of the world industry needs to employ technology based educated graduates from vocational schools. Especially, electrical and electronics technicians which also have good IT hardware background are demanded much more than the other areas of the technology. Since most of the sectors of industry are based on electronics and computing background, the employment of technology based good computer hardware experienced, electrical and electronics technology graduates are essential for the safe improvement of industrial institutions.

Also those graduates who have good computer hardware and computer aided drawing experiences are preferred in the construction technology and drawing applications in the industry.

Graduates from computer programming also play an important role in the industry in the computer application based projects.

Good curriculum design, industry and project development experienced teaching staff, specialization on selected field of electrical and electronics technology education, effective integration of industry and education and effective summer training programs are the essentials of technology education.

Beside the vocational education, students have to be fluent in a second language, preferably English (since English is most widely used all over the world) and also multi-cultural activities of the students must be well developed.

Vocational orientation for the freshman students carries an important role in understanding the aim of electrical and electronics technology and its relation with the industry. Also, students will learn how they can get their lives, make investment, increase their industrial capacity etc. during the vocational orientation course and summer training periods.

The students will follow a common curriculum, and will be specialized in an area by selecting the required stream of courses and preparing his summer training in the related area.

The duration of the programs can be one, two or three years. The curriculum will also serve as a special certification program and give certificates for each chosen course from the curriculum. Course certification will attract the people already employed in industry in order to improve their technical knowledge and abilities.

In order to survive and be considered, countries have to make their future plans and arrangements with an aim to become an industrialized country with their industrialized societies. Vocational and Information Technology education is the major factor in becoming an industrialized country under a good administrative and application policy.

## **2 The Set of Skills Required For An MVE Graduate For A Successful Carrier In An Industrialized Society**



Discipline [1] is defined as a particular area of study provided that it has unified tools, techniques and methods and a well developed jargon. Disciplines are said to develop into self contained hard-shells, which tend to minimize interaction with outside entities and other disciplines through the fiercely defended territories.

The set of skills required for a successful electrical and electronics technology profession could be exploited into three different categories. Each of these skills will be investigated in the following sections.

### **2.1 The Soft Skills**

These are the general skills required for every person employed in an industrial institution. These skills are mainly reading, writing, language, basic mathematics, presentation, group work, communication skills, self learning, troubleshooting and problem-solving ability. These skills are not limited and can be extended according to the nature of the profession carried out in industry.

### **2.2 Electrical, Electronics and Computer Hardware Professional Skills**

These skills are directly related to the major interest of the profession such as electrical installation, motor control and winding, electronic trouble-shooting and maintenance, computer troubleshooting and maintenance and also microprocessors. EET specialists can also take on duties as electronic components and equipments marketing, PC operator and office programs user.

### **2.3 Construction Technology and Drawing Professional Skills**

These skills are directly related to the major interest of the profession such as basic computer hardware and software skills and application of the architectural design soft wares. Also surveying and construction quantities skills are required for these specific streams.

## **3 MVE Curriculum and Grouping of the Courses**

The proposed MVE curriculum structure is shown in Fig. 1. The structure of MVE curriculum has eight main optional areas, which are electrical installation, electronics,

motor control and winding, computer (PC) hardware and microprocessor, PLC (Programmable Logic Control), computer programming, construction and drawing.

In the first year the students will complete the background courses and in the second year they will chose one of five options. In summer training, the students have to join to industry for 50 working days in the selected area.

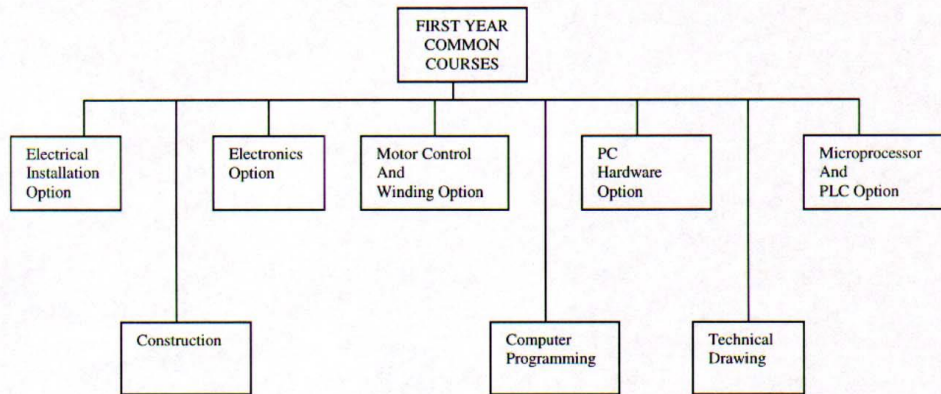


Fig.1: MVE Curriculum Structure [3]

First year fall and spring semesters courses are shown in Fig 2.

FIRST YEAR				
Fall semester				
Course code	Reference code	Course name	Credits	Prerequisite
EFL 171	30111	Basic English I	(4,0)4	-----
MATH117	30112	Basic Mathematics	(4,0)4	-----
MVE 111	30113	Vocational Orientation	(3,0)3	-----
MVE 143	30114	Basic Construction Tech.	(2,3)3	-----
MVE 101	30115	Introduction to Computing	(2,3)3	-----
MVE 145	30116	Basic Drawing	(2,4)4	-----
Spring semester				
EFL 172	30211	Basic English II	(4,0)4	EFL 171



MVE 132	30212	Intro. to Business	(3,0)3	
MVE 134	30213	Intro. to Basic Electronics	(2,3)3	-----
MVE 136	30214	Technical English	(4,0)4	
MVE 162	30215	Comp. Hardware	(2,3)3	-----
MVE 168	30216	Math II	(4,0)4	MATH 117

Fig.2: First year fall and spring semester courses [1]

In the first summer holiday, the students are required to join to the industry for first summer training for 50 working days in the area that is going to be chosen in the second year. Figure 3 shows the first summer period of summer training. The students are not allowed to register summer school courses unless they complete the first summer training period.

Summer period				
Course code	Reference code	Course name	Credits	prerequisites
MVE 100	32100	Summer training	(50 working days)3	-----

Fig.3: First summer period [1]

During the first year students take two basic English courses, two computing courses, two electronics courses, one electrical installation course and one motor control and winding course. Also apart from these courses one basic mathematics, one electro-technology one digital electronics and one vocational orientation course are taken. At the end of the first year the students are required to get an average of two out of four in order to pass to the second year and choose an area to continue.

Figure 4 shows the grouping and types of the first year courses;

English	Comp	Electro	Contra.	Vocational Orientation	Math's	Business	Drawing
3	2	1	1	1	2	1	1

Fig.4: No and type of courses in the first year

Those students who got an overall average of 2 out of 4 and complete his/her 50 days summer training period can register to the second year with a selected area. The summer training defense jury consists of the academic staff of the department, one representative from information technology department, and at least two representatives from industry in the related summer training area.

There are five options in the second year which are electrical installation, electronics, motor control and winding, computer hardware and microprocessors/programmable logic controllers, and the students are accepted according to their overall averages of their first years. There are 6 courses in each option in the first year first semester.

### 3.1 Option I: Electrical installation

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
EFL 271	32231	Technical English I	(4,0)4	-----
EET 261	32232	Electrical Installation II	(2,3)3	-----
EET 263	32233	Electrical Installation Materials	(2,3)3	-----
EET 265	32234	Power Generation and Distribution	(2,3)3	-----
EET 267	32235	Electrical installation Project design	(2,3)3	-----
EET 269	32236	Electrical Installations Control and Testing	(2,3)3	-----

Fig.5: Electrical installation option courses [2]

In the electrical installation option the students will take six courses related with the electrical installation. In this option, students are required to make all necessary



calculations such as voltage drop, illumination, load, cable size, transformer and generator. They are also required to identify all low and high voltage materials, design an electrical installation project by using AUTOCAD and manual design. Also the students are required to have information about power generation and distribution via transformer centers and sub transformer stations. At the end of this semester a student will be able to design, install, test and control high and low voltage systems.

### 3.2 Option II: Electronics

The students who complete the first year and get an average of two out of four and choose electronics option will register to the following courses which are shown in Fig.6.

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
EFL 271	33231	Technical English I	(4,0)4	-----
EET 261	33232	Electronics II	(2,3)3	-----
EET 263	33233	Electronics Workshop	(2,3)3	-----
EET 265	33234	Telecommunications	(2,3)3	-----
EET 267	33235	Digital Electronics	(2,3)3	-----
EET 269	33236	Electronic materials	(2,3)3	-----

Fig. 6: Electronics option courses [2]

In the electronics option the students will take six courses related with the electronics. In this option, students are required to obtain the necessary all necessary information for electronics technology and improve their ability to design printed circuit boards, soldering etc. (necessary requirements to design, print and realize any electronics circuit) They are also required to identify all electronics technology materials, design an electronics circuit by using circuit maker and tracks maker software and manually. At the end of this semester a student will be able to design, construct, test and control electronic circuits

### 3.3 Option III: Motor Control and Winding

The students who complete the first year and get an average of two out of four and choose motor control and winding option will register to the following courses which are shown in Fig.7.

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
EFL 271	34231	Technical English I	(4,0)4	-----
EET 261	34232	Basic Principles of DC and AC Electrical machines	(2,3)3	-----
EET 263	34233	Electrical Machines Workshop	(2,3)3	-----
EET 265	34234	Single and three phase ac Motors Applications	(2,3)3	-----
EET 267	34235	DC motors Applications	(2,3)3	-----
EET 269	34236	Motor and motor control materials	(2,3)3	-----

Fig. 7: Electronics option courses [2]

In the motor control and winding option the students will take six courses related with the electronics. In this option, students are required to obtain the necessary information for ac and dc motors, 3 phase and single phase motors and control improve their ability to design and control all types of motors. They are also required to identify all technology materials of motors and their control. At the end of this semester a student will be able to construct, test, control and winding of all types of motors.

### 3.4 Option IV: Computer Hardware



The students who complete the first year and get an average of two out of four and choose computer hardware option will register to the following courses which are shown in Fig. 8

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
EFL 271	35231	Technical English I	(4,0)4	-----
EET 261	35232	Introduction to Computer Hardware	(2,3)3	-----
EET 263	35233	Computer Networks	(2,3)3	-----
EET 265	35234	Visual Programming	(2,3)3	-----
EET 267	35235	Computer Troubleshooting	(2,3)3	-----
EET 269	35236	Digital Electronics	(2,3)3	-----

Fig. 8: Computer hardware option courses [2]

In the computer hardware option the students will take six courses related with the computer hardware and software. In this option, students are required to obtain the necessary information for computer technology. They are also required to identify all types of computers and computer faults. At the end of this semester a student will be able to construct, test, control and set up the computers

### 3.5 Option V: Microprocessors and Programmable Logic Control (PLC)

The students who complete the first year and get an average of two out of four and choose microprocessors and PLC option will register to the following courses which are shown in Fig.9

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites

EFL 271	36231	Technical English I	(4,0)4	-----
EET 261	36232	Microprocessor Programming Techniques	(2,3)3	-----
EET 263	36233	Programmable Logic Controllers	(2,3)3	-----
EET 265	36234	Visual Programming	(2,3)3	-----
EET 267	36235	Computer Applications	(2,3)3	-----
EET 269	36236	Digital Electronics	(2,3)3	-----

Fig. 9: Microprocessors and programmable logic control option courses [2]

In the microprocessors and PLC option the students will take six courses related with the microprocessors and PLC. In this option, students are required to obtain the necessary information for microprocessor and PLC programming techniques. They are also required to identify all types of microprocessors and PLCs. At the end of this semester a student will be able to construct, test, control and program microprocessors and PLCs.

### 3.6 Option VI: Construction Technology (CNST)

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
CNST 143	37231	Materials of Construction	(4,0)4	-----
CNST 172	37232	Basic Engineering Drawing	(2,4)4	-----
CNST 141	37233	Construction Technology and Practice	(2,3)3	-----
CNST 162	37234	Surveying	(2,4)4	-----
CNST 271	37235	Civil Engineering Drawing	(2,4)4	-----
CNST 263	37236	Quantities	(2,3)3	-----



Fig. 10: Construction Technology option courses [2]

In CNST option the students will take six courses related with drawing, materials, surveying and construction technology. In this option, students are required to obtain the necessary experience and information about all the aspects of construction technology. They are also required to identify all types of construction techniques and quality of work. At the end of this semester a student will be able to construct, test, control and approve an application in construction industry.

### 3.7 Option VII: Computer Programming (CPIT)

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
CPIT 114	38231	Structured Programming	(4,0)4	-----
CPIT209	38232	Internet Programming	(2,3)3	-----
CPIT217	38233	Visual Programming	(2,3)3	-----
CPIT 218	38234	Visual Programming Applications	(2,3)3	-----
CPIT 213	38235	Structured Programming I	(2,3)3	-----
CPIT 212	38236	Data Base Management System	(2,3)3	-----

Fig. 11: Computer Programming option courses [2]

In CPIT option the students will take six courses related with the programming and database techniques. In this option, students are required to obtain the necessary information needed for computer software development and desktop applications. They are also required to identify all types of programming languages with all facilities. At the end of this semester a student will be able to identify the problem, propose a solution and develop the necessary software and database programs.

### 3.8 Option VIII: Computer Aided Technical Drawing (CATD)

SECOND YEAR				
First semester				
Course code	Reference code	Course name	Credits	Prerequisites
CATD 122	39231	Drafting Studio	(4,0)4	-----
CATD 124	39232	Construction Tech.	(2,3)3	-----
CATD 281	39233	CAD	(2,4)4	-----
CATD 222	39234	Materials of Contr.	(3,0)3	-----
CATD 224	39235	Engineering Drawing	(2,4)4	-----
CATD 282	39236	3 D CAD Applications	(2,4)4	-----

Fig. 12: Computer Aided Technical Drawing option courses [2]

In CATD option the students will take six courses related with construction materials and techniques, engineering drawing and CAD (Computer Aided Drawing) applications. In this option, students are required to obtain the necessary information experience for the required drawing applications and construction techniques. They are also required to identify all types of designing techniques and computer applications in designing. At the end of this semester a student will be able to draw, test, and control 2D ( Two Dimensional) and 3D (Three Dimensional) applications of architectural drawings .

#### 4. Second Year Second Semester

In the second year second semester each student will register a graduation project and a summer training course and the duration of summer training and graduation project course will be 50 working days. In the second half of the semester (30 working days) the



students will prepare themselves for the graduation proficiency examination. The proficiency examination will cover all the courses and all the practical applications covered during the education period. Summer trainings and graduation project are examined by the juries which consist of teachers and businessmen from the industry. A successful summer training and graduation project will help the employment of the graduates. Those who will own their own workshop or business will get feedback, after summer training, from the department. Figure 13 shows the courses of the second year second semester;

Second Year				
Second Semester				
Course code	Reference code	Course name	Credits	prerequisites
MVE 200	32200	Industrial training	(50 working days)3	
MVE 300	32300	Graduation Project	(50 working days)3	

Fig. 13 Second year second semester training

After completing all of the requirements, the students are required to sit for a proficiency examination which will cover all of the courses covered by the students. If a fail is obtained by the proficiency the second chance will be given to the candidates. Those who succeed will get "Higher Diploma" and those who are failed will get "Diploma" in the related subject.

## 5 Discussions and Conclusions

In the future development picture of Cyprus and in a case of a solution to Cyprus problem, the needs to high quality, well educated technology graduates will reach to maximum. The hierarchy in industry and the quality of work done will be well developed and well modified with the existence of such high quality educated people. This curriculum can also be used for continuing education purposes and will give chance to register to selected courses only. Those candidates who register only some specific courses, under continuing education program, will get a certificate. Therefore the people

already working in industry can register to some courses to update his knowledge or get new information about any subject related to the curriculum.

#### **References**

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