



**BASELINE STUDY, AND THE PREPARATION TOWARDS THE XXIST CENTURY
UNDERGRADUATE DECK AND ENGINE CURRICULA
OF ISTANBUL TECHNICAL UNIVERSITY, MARITIME FACULTY**

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ABSTRACT

In this paper, it is presented that STCW 95, Chapters II and III, Regulations II/1, II/2, III/1, III/2 define the mandatory minimum training and education requirements for certification of watchkeeping officers, masters, chief mates, and oceangoing engineering officers, second engineer officers, chief engineer officers.

The general state / private education system in Turkey is given in detail with some striking examples. The existing Merchant Maritime Education which has classically been a 4+1 year University Degree Education with the Istanbul Technical University, Maritime Faculty is presented in comparison with other newly founded Turkish Institutions after STCW 95, emphasizing on the problems experienced.

A model of a baseline study, and preparations towards the XXI. Century Merchant Maritime Undergraduate Education curricula's of Turkey towards finding solutions for the existing problems of the education system is clearly defined.

**A. INTRODUCTION – STCW '95
REQUIREMENTS**

**1. STCW 95 – Chapter II – Master and
Deck Department Regulation II/1**

Mandatory minimum requirement for certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more

Paragraph 2 in regulation II/1 of the STCW 95 (Ref. 1) convention states

Every candidate for certification shall:

- .1 be not less than 18 years of age
- .2 have approved seagoing service of not less than one year as part of an approved training programme which includes on-board training which meets the requirements of section A-II/1 of the STCW Code and is documented in an approved training record book, or otherwise have approved seagoing service of not less than three years;

- .3 have performed, during the required seagoing service, bridge watchkeeping duties under the supervision of the master or a
- .4 qualified officer for a period of not less than six months
- .5 meet the applicable requirements of the regulations in chapter IV, as appropriate, for performing designated radio duties in accordance with the Radio Regulations; and
- .6 have completed approved education (IMO Model Course 7.03 – Officer in Charge of a Navigational Watch – Ref. 5) and training and meet the standard of competence specified in Section A-II/1 of the STCW Code which can be simplified as

Every candidate for certification shall

- (a) be not less than 18 years of age
- (b) satisfy the Administration as to Medical fitness, particularly regarding eyesight and hearing;
- (c) have approved seagoing service in the deck department of not less than three years which shall include at least six months of bridge watchkeeping duties under the supervision of a qualified officer; however an Administration may allow the substitution of a period of special training for not more than two years of this approved seagoing service (IMO Model Course 7.03), provided the Administration is satisfied that such training is at least equivalent in value to the period of seagoing service it replaces;
- (d) satisfy the Administration by passing an appropriate examination that he possesses adequate theoretical and practical knowledge appropriate to this duties.

In preparing IMO Model Course 7.03 it has been assumed that the entrants will have successfully completed a minimum period of full-time general education of about 10 or 11 years. For example in U.K. full-time general education starts at the age of 4, and is mandatory for 11 years which means one can satisfy the entry standards to the profession at the age of 15.

2. STCW 95 – Chapter II – Master and Deck Department – Regulation II/2

Mandatory minimum requirements for certification of masters and chief mates on ships of 3,000 gross tonnage or more.

Paragraph 2 in Regulation II/2 of the STCW 95 (Ref.1) convention states

Every candidate for certification shall;

- .1 meet the requirements for certification as an officer in charge of a navigational watch on ships of 500 gross tonnage or more and have approved seagoing service in that capacity
 - .1.1. for certification as chief mate, not less than 12 months, and
 - .1.2. for certification as master, not less than 36 months; however, this period may be reduced to not less than 24 months if not less than 12 months of such seagoing service has been served as chief mate, and
- .2 have completed approved education (IMO Model Course 7.01 – Master and Chief Mate – Ref.3) and training and meet the standard of competence specified in section I-II/2 of the STCW Code for masters and chief mates on ships of 3,000 gross tonnage or more

SUMMARY – This implies that a 14/15 year old candidate who started 10/11 years full time general education at the age of 4, can be a W/O at the age 18 attending to a two years of IMO Model Course 7.03 Education, and 1 year of on board training (6 months bridge watchkeeping) after an exam. Then, after 1 year of IMO Model Course 7.01 Education, with another one year on board a vessel as W/O, he can sit for an exam of C/M, at the age of 20. Or with another two years on board a vessel as 1 year W/O, and 1 year C/M, he can sit for an exam of a Master at the age of 21.

This is enabling a 14 years old candidate with 10/11 years of full time general basic education to be a Master in 7 years time at the age of 21 attending to some private courses without any High School Education, never mind University Education.

3. STCW 95 – Chapter III – Engine Department – Regulation III/1

Mandatory minimum requirements for certification of officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine room.

Paragraph 2 in Regulation III/1 of the STCW 95 (Ref.1) convention states

Every candidate for certification shall:

- .1 be not less than 18 years of age
- .2 have completed not less than six months seagoing service in the engine department in accordance with section A-III/1 of the STCW Code, and
- .3 have completed approved education (IMO Model Course 7.04 – Engineer Officer in Charge of a Watch – Ref.6) and training of at least 30 months which includes on-board training documented in an approved training record book and meet the standards of

competence specified in Section A-III/1 of the STCW Code.

which can be restated more clearly as

Every candidate for certification shall:

- (a) be not less than 18 years of age
- (b) satisfy the Administration as to medical fitness, including eyesight and hearing;
- (c) have not less than a total of three years approved education (IMO Model Course 7.04) or training, relevant to the duties of a marine engineer;
- (d) have completed an adequate period of seagoing service (6 months) which may have been included within the period of three years in sub-paragraph (c)
- (e) satisfy the Administration that he has the theoretical and practical knowledge of the operation and maintenance of marine machinery appropriate to the duties of an engineer officer;
- (f) have attended an approved practical fire-fighting course;
- (g) have knowledge of safe working practices

In preparing IMO Model Course 7.04 to meet the minimum age for certification (18 years) and to obtain the minimum of three years specialized education or training, the age of entry could be 15 years, or less.

4. STCW 95 – Chapter III – Engine Department – Regulation III/2

Mandatory minimum requirements for certification of chief engineer officers and second engineer officers on ships powered by main propulsion machinery of 3000 kw

propulsion power or more. Paragraph 2 in Regulation III/2 of the STCW 95 (Ref.1) convention states

Every candidate for certification shall;

- .1 meet the requirements for certification as an officer in charge of an engineering watch and;
 - .1.1. for certification as second engineer officer, shall have not less than 12 months' approved seagoing service as assistant engineer officer or engineer officer, and
 - .1.2. for certification as chief engineer officer, shall have not less than 36 months' approved seagoing service of which not less than 12 months shall have been served as an engineer officer in a position of responsibility while qualified to serve as second engineer officer; and
- .2 have completed approved education (IMO Model Course 7.02 Chief and Second Engineer Officer (Motor Ships) – Ref.4) and training and meet the standard of competence specified in Section A-III/2 of the STCW Code.

SUMMARY – This implies that a 14/15 year old candidate who started the basic full-time general education at the age of 4, can be an E/O at the age of 18 attending to a three years of IMO Model Course 7.04 Education which includes 6 months seagoing service, after an exam. Then after 1 year of IMO Model Course 7.02 Education, with another one year on board a vessel as E/O, he can sit for an exam of second E/O, at the age of 20. Or with another 3 years on board a vessel as 1 year E/O, and 2 years second E/O, he can sit for an exam of a Chief Engineer at the age of 23.

This is enabling a 14/15 years old candidate with 10/11 years of basic full-time general education to be a C/E in 8 years time at the age of 23 attending to some private courses without any High School Education, never mind University Education.

B. EXISTING GENERAL EDUCATION SYSTEM IN TURKEY

Refer to **Figure 1** for the existing general education system in Turkey. Pre-school education starts at the Nursery between the ages 0-2. Kindergarten education is given between the ages 2-6. Classical Primary School is for five years between the ages 6 to 11 which is run by the state, free of charge and is mandatory. Then, pupils attend to a Junior High school for 3 years between 11-14 years old. The very new system is an 8 year education (a combination of Primary + Junior High School) which is compulsory till the age of 14. Pupils attend to High School run by the state, free of charge between 14-17 years old. Sometimes either before Junior High or High School, they attend to a full year of Foreign Language (mainly English) preparatory class which enables them to attend the University at the age of 18.

In Turkey there are 74 state and privately run (approximately 20) Foundation Universities. The quality of education differs enormously from one another. Istanbul Technical University is one of the top 4-5 Universities in Turkey. Every year almost 1.5 Million High School Graduates take a General Entrance Exam for the universities. Depending on their success, they are placed in Universities of one of their 22 choices. As an average only 500,000 High School Graduates can be offered places in Universities, the rest having to take the exam next year. To attend to a top University, one must be placed in the top 10-15% of the 1.5 Million High School Graduates.

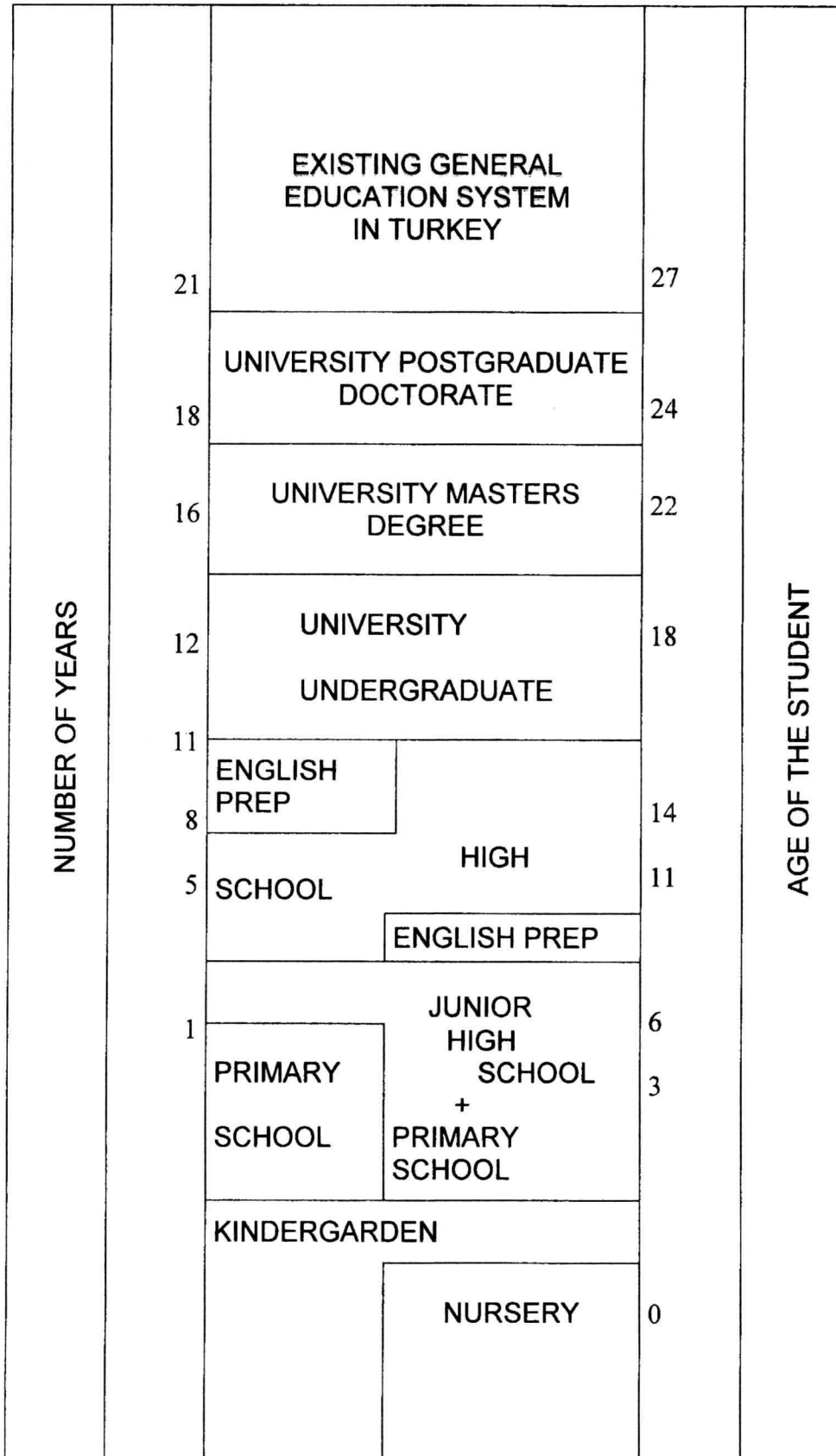


FIGURE 1 Existing General Education System in Turkey.

| <u>IX YEAR</u> | <u>HRS/WEEK</u> | <u>X. YEAR</u> | <u>HRS/WEEK</u> | <u>XI. YEAR</u> | <u>HRS/WEEK</u> |
|---------------------|-----------------|---------------------|-----------------|---------------------|-----------------|
| Literature | 4 | Literature | 4 | Literature | 4 |
| Religion | 1 | Religion | 1 | Religion | 1 |
| History | 2 | History | 2 | History | 2 |
| Geography | 2 | Culture | 1 | Philosophy | 2 |
| Maths | 5 | Composition | 3 | Literature | 3 |
| Biology | 2 | Psychology | 2 | Geography | 3 |
| Physics | 2 | Geography | 2 | Maths | 5 |
| Chemistry | 2 | Maths | 5 | Geometry | 2 |
| Health | 2 | Geometry | 2 | | |
| Languages | 4 | Analytic geometry | 2 | | |
| Physical Ed. | 2 | | | | |
| | <u>28</u> | | <u>24</u> | | |
| Electives | 5 | Electives | 6 | Electives | 6 |
| | | Languages (1) | | Logic | 2 |
| | | Languages (2) | | Sociology | 2 |
| <u>TOTAL</u> | 33 | Computers | | Languages | 2 |
| | | | <u>30</u> | | <u>28</u> |
| | | Arts | 1 | Law | 2 |
| | | Music | 1 | Arts | 1 |
| | | Physical Ed | 1 | Music | 1 |
| | | <u>TOTAL</u> | 33 | Physical Ed | 1 |
| | | | | <u>TOTAL</u> | 33 |

Figure 2. State High School Program in Turkey

TABLE 1 (a) MATHS CURRICULUM OF THREE YEARS AT HIGH SCHOOL

FINAL YEAR

FUNCTIONS
LIMITS
CONTINUITY FUNCTIONS
DIFFERENTIALS
INTEGRALS
LINEAR ALGEBRA

SECOND YEAR

TRIGONOMETRY
RANDOM NUMBERS
LOGARITHMS
PERMUTATION, COMBINATION,
PROBABILITY
SERIES

FIRST YEAR

LOGIC
SETS
FUNCTIONS
NUMBERS
POLYNOMIALS
EQUATIONS, INEQUALITIES, FUNCTIONS

TABLE 1 (b)-PHYSICS CURRICULUM OF THREE YEARS AT HIGH SCHOOL

FINAL YEAR

LIGHT
WAVE MOTION
LIGHT THEORY
ATOM THEORY
MOVEMENT OF PARTICLES IN
ELECTRICAL FIELD
SOLAR ENERGY

SECOND YEAR

FORCE
MOTION
NEWTONS LAW
GRAVITATIONAL MOTION
IMPULSE AND MOMENTUM
ENERGY
MAGNETISM
ELECTROSTATICS
ELECTRICAL CURRENT
ELECTROMAGNETIC INDUCTION

FIRST YEAR

PROPERTIES OF A PURE SUBSTANCE
PURE SUBSTANCE AND ELECTRICITY

For Example, Istanbul Technical University has 11 Faculties. To enter to Faculties Like Industrial, Electrical (computer) Engineering; one must be in the top 1-2% where as the Faculty of Mines and Ores accept students from the top 15%, ITUMF students come from the top 8-10%.

Students without proficiency in Languages, attend to a one year Language Preparatory class before they start to their normally 4 year University Undergraduate program. Only disciplines like Medicine, Veterinary science etc.. are for six years. Students graduate from the University at the age of 22-24.

Postgraduate programs of Masters and Doctors degrees are normally for 2 and 3

years, respectively. Students complete a combined MSc + PhD Postgraduate Study at the age of 27-30.

Refer to **Figure 2** for the three year State High School program where the quality of education is very high by all International standards. A typical example of the curriculum of Mathematics, and Physics at three years of a State High School before entering to the University will support this argument, presented in **Table 1 (a), 1(b)**.

C. EXISTING MERCHANT MARITIME EDUCATION SYSTEM IN TURKEY –

The Merchant Maritime Education in Turkey has classically been a 4+1 year University Degree Education with the Istanbul Technical University Maritime Faculty, for both Deck and Engine Departments.

Refer to **Figures 3, and 4** for the Program structure of Deck, and Engine Department Education at ITUMF with 8 semester programs presented in **Tables 2, and 3**. (Ref.2)

In 1995 when STCW 95 was drafted giving major importance to “Training and

Assessment – Regulation I/6”, “Quality Standards – Regulation I/8”, “Use of Simulators – Regulation I/12”, all undergraduate programs of ITUMF have been reconsidered to be carefully transformed into the format of Figures 2, and 3 which are mainly “7.01+7.03+PLUS” for Deck Department, and “7.02+7.04+PLUS” for Engine Departments. An Integrated Quality System of ISO 9002 + ISO 14001 acquired separately from Class NKK of Japan, and RINA / IQNET of ITALY achieved for the first time in any Higher Education Institute in Europe accredits the Undergraduate programs system of ITUMF to 35 IQNET member countries.

In 1995 when STCW 95 started to be widely pronounced, the Administration in Turkey which is the Prime Ministry, Undersecretariat for Maritime Affairs gave major importance for the same number of hours of IMO Model Courses to be included in Undergraduate Programs. With other obligatory courses of the Turkish Higher Education Law of No. 2547, the programs presented 35-40 hours of education per week causing a number of inconveniences.

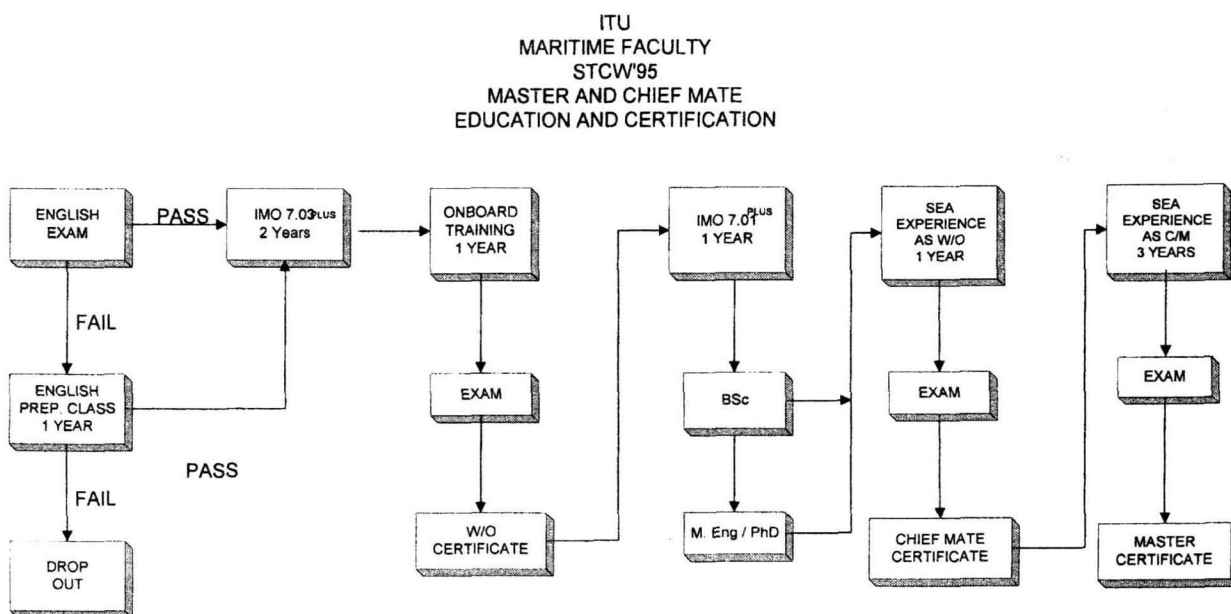


Figure 3

ITU
MARITIME FACULTY
STCW'95
CHIEF AND SECOND ENGINEER OFFICER
EDUCATION AND CERTIFICATION

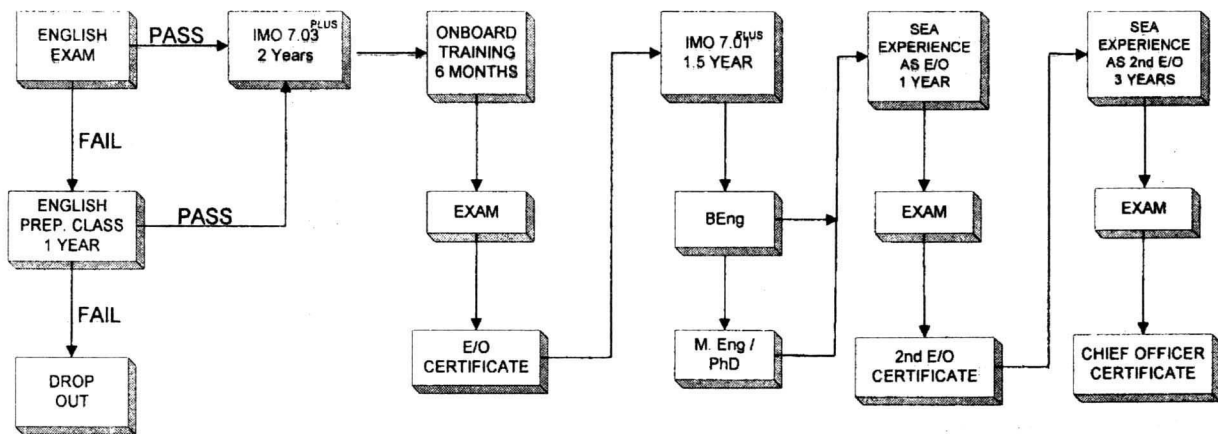


Figure 4

Administration concentrated on the number of hours (quantity) being similar to IMO Model Courses for undergraduate programs, but overlooked at the level and the quality of the contents covered in these number of hours. Due to bureaucratic reasons, institutes had to follow the administration for being eligible at the Certificate of Competency Exams of Seafarers.

There are mainly four categories of Merchant Maritime (human resources) Education in Turkey, at present

1. ITUMF - 150 students / year

Istanbul University, Marine Transportation, Administration Dept. - 50 students / year

İzmir Dokuz Eylül University, Maritime College - 50 students / year

KTU, Sürmene Marine Sciences Faculty - 50 students / year

These are 4+1 year state education Institutes after High School leading to Oceangoing Master/ Chief Engineering

certificates in the long run with capable academical staff body, International campus facilities, laboratories, and Administration approved undergraduate program (with Graduate Schools as well) emphasis given to English Language. All State Universities are attended with symbolic tuition fee. (Ref 7-14)

2. ITU, Maritime Junior College - 150 students / year

Kocaeli - Karamürsel Maritime Junior College - 600 students / year

Uludağ - Yalova Maritime Junior College - 50 students / year

These are two year courses after high school only leading to W/O, and E/O certificates with 7.03, and 7.04 IMO Model Courses covered relatively for Deck and Engine Departments. Programs are Administration approved, but all have comparatively limited staff, laboratories. Students with rather lower scores of University Entrance Examination are admitted. All state Universities are attended with symbolic tuition fees.

TABLE 2. MARINE ENGINEERING DEPARTMENT CURRICULUM

| | | | | | |
|-------------------------|---|-------|---------------------------|--|-------|
| First Semester | | | Second Semester | | |
| GMZ 100 | Mathematics I | (4-2) | GMZ 200 | Mathematics II | (4-2) |
| GMZ 101 | Physics | (3-1) | GMZ 201 | Physics II | (3-1) |
| GMZ 102 | Marine Chemistry | (2-1) | GMZ 214 | Engineering Drawing II | (2-2) |
| GMZ 105 | Computer Programming | (2-1) | GMZ 215 | Workshop II | (2-4) |
| GMZ 114 | Engineering Drawing I | (2-2) | GMZ 221 | Introduction to Marine Engineering II | (3-0) |
| GMZ 115 | Workshop I | (1-3) | GMZ 222 | Statics | (2-0) |
| GMZ 121 | Introduction to Marine Engineering I | (3-0) | GMZ 260 | English for Engine Officers II | (3-0) |
| GMZ 160 | English for Engine Officers I | (3-0) | GMZ 265 | Physical Education II | (1-1) |
| GMZ 165 | Physical Educating I | (1-1) | | | |
| ESP | Introduction to Computer Programming | (2-0) | ESP | General Aspect of Marine Engineering | (2-0) |
| Third Semester | | | Fourth Semester | | |
| GMZ 300 | Mathematics III | (4-0) | GMZ 400 | Mathematics IV | (4-0) |
| GMZ 310 | Dynamics | (3-1) | GMZ 405 | Numerical Analysis | (2-0) |
| GMZ 315 | Workshop III | (2-4) | GMZ 409 | Material Science | (3-0) |
| GMZ 317 | Introduction to Marine Electrotechnology | (4-0) | GMZ 411 | Strength of Materials | (3-1) |
| GMZ 318 | Operation and Maintenance of Main and Auxiliary Machinery I | (4-4) | GMZ 415 | Workshop IV | (2-4) |
| GMZ 319 | Thermodynamics I | (3-0) | GMZ 417 | Marine Electrotechnology I | (3-1) |
| GMZ 360 | English for Engine Officers III | (2-0) | GMZ 418 | Operation and Maintenance of Main and Auxiliary Machinery II | (2-2) |
| GMZ 361 | History of the Turkish Revolution I | (2-0) | GMZ 419 | Thermodynamics II | (3-0) |
| | | | GMZ 460 | English for Engine Officers IV | (2-0) |
| | | | GMZ 461 | History of the Turkish Revolution II | (2-0) |
| ESP | Marine Hydraulics | (2-0) | ESP | Energy and Energy Sources | (2-0) |
| ESP | Introduction to Naval Architecture | (2-0) | ESP | Energy Conversion | (2-0) |
| Fifth Semester | | | Sixth Semester | | |
| GMZ 517 | Marine Electrotechnology II | | 4 Months OnBoard Training | | |
| GMZ 518 | Fluid Mechanics | | 28 Credits | | |
| GMZ 520 | Heat Transfer | | | | |
| GMZ 525 | Marine Diesel Engines I | | | | |
| GMZ 526 | Marine Auxiliary Machinery I | | | | |
| GMZ 527 | Naval Architecture | | | | |
| GMZ 532 | Machine Design | | | | |
| GMZ 566 | Turkish I | | | | |
| ESP | Marine Heat Engines | | | | |
| Seventh Semester | | | Eighth Semester | | |
| GMZ 722 | Steam Boilers | (3-0) | GMZ 823 | Steam Turbines II | (3-0) |
| GMZ 723 | Steam Turbines I | (2-1) | GMZ 824 | Gas Turbines | (2-0) |
| GMZ 725 | Marine Diesel Engines II | (4-2) | GMZ 825 | Marine Diesel Engines III | (3-1) |
| GMZ 726 | Marine Auxiliary Machinery II | (3-1) | GMZ 828 | Survey Procedures | (2-0) |
| GMZ 732 | Electronics | (3-0) | GMZ 829 | Refrigeration | (3-0) |
| GMZ 733 | Automatic Control | (3-0) | GMZ 834 | Heating, Ventilation and Conditioning | (3-0) |
| GMZ 740 | Management Economy | (2-0) | GMZ 859 | Maritime Law | (2-0) |
| GMZ 753 | Labor Law | (2-0) | GMZ 844 | Simulator | (2-3) |
| GMZ 766 | Turkish II | (2-0) | GMZ 880 | Project | (2-4) |
| ESP | Power Plants | (2-0) | ESP | Marine Engineering | (3-0) |
| | | | ESP | Mechanical Vibrations of Ships | (3-0) |
| | | | ESP | Personnel Management | (2-0) |

* Credit hours, (Theory-Practice)

** English Language Supported Programme

TABLE 3. DECK DEPARTMENT CURRICULUM

| | | | | | |
|------------------|--------------------------------------|-------|----------------------------|--------------------------------------|-------|
| First Semester | | | Second Semester | | |
| GVZ 100 | Mathematics I | (4-0) | GVZ 200 | Mathematics II | (4-0) |
| GVZ 101 | Physics I | (2-1) | GVZ 201 | Physics II | (3-1) |
| GVZ 102 | Marine Chemistry | (2-1) | GVZ 210 | Statics | (2-0) |
| GVZ 105 | Computer Programming | (2-1) | GVZ 233 | Watchkeeping I | (4-0) |
| GVZ 121 | Ship Power Plants I | (2-0) | GVZ 235 | Seamanship II | (2-1) |
| GVZ 135 | Seamanship I | (1-1) | GVZ 239 | Navigation II | (4-2) |
| GVZ 139 | Navigation I | (4-2) | GVZ 242 | Safety at Sea II | (1-1) |
| GVZ 142 | Safety at Sea I | (1-1) | GVZ 260 | English for Deck Officers II | (3-0) |
| GVZ 160 | English for Deck Officers I | (3-0) | GVZ 265 | Physical Education II | (1-1) |
| GVZ 165 | Physical Education I | (1-1) | | | |
| ESP** | Introduction to Computer Programming | (2-0) | ESP | Basic Marine Terminology | (2-0) |
| Third Semester | | | Fourth Semester | | |
| GVZ 300 | Mathematics III | (3-0) | GVZ 400 | Mathematics IV | (3-0) |
| GVZ 303 | Spherical Trigonometry | (2-0) | GVZ 418 | Fluid Mechanics | (2-0) |
| GVZ 312 | Dynamics | (2-0) | GVZ 431 | Ship Stability I | (3-1) |
| GVZ 317 | Electronics | (2-1) | GVZ 439 | Navigation IV | (4-2) |
| GVZ 327 | Ship Construction | (2-0) | GVZ 440 | Electronic Navigation I | (2-2) |
| GVZ 333 | Watchkeeping II | (4-0) | GVZ 442 | Safety at Sea III | (2-2) |
| GVZ 335 | Seamanship III | (2-2) | GVZ 459 | Economy | (2-0) |
| GVZ 339 | Navigation III | (4-2) | GVZ 460 | English for Deck Officers IV | (2-0) |
| GVZ 360 | English for Deck Officers III | (2-0) | GVZ 461 | History of the Turkish Revolution II | (2-0) |
| GVZ 361 | History of the Turkish Revolution I | (2-0) | | | |
| ESP | Introduction to Naval Architecture | (2-0) | ESP | Cargo Handling and Stowage | (3-0) |
| | | | ESP | Emergency Procedures | (2-0) |
| | | | ESP | Shipping | (2-0) |
| | | | ESP | Port Management | (2-0) |
| Fifth Semester | | | Sixth Semester | | |
| GVZ 534 | Ship Manoeuvring and Handling I | (1-1) | 7 Months OnBoard Training | | |
| GVZ 537 | Meteorology I | (2-1) | 15 February – 15 September | | |
| GVZ 539 | Navigation V | (4-2) | 28 Credits | | |
| GVZ 540 | Electronic Navigation II | (2-2) | | | |
| GVZ 541 | Cargo Handling and Stowage I | (4-0) | | | |
| GVZ 545 | Marine Communication I | (2-2) | | | |
| GVZ 547 | Basic Law | (2-2) | | | |
| GVZ 566 | Turkish I | (2-0) | | | |
| ESP | Chartering and Broking | (2-0) | | | |
| Seventh Semester | | | Eighth Semester | | |
| GVZ 721 | Ship Power Plants II | (2-0) | GVZ 833 | Watchkeeping III | (2-0) |
| GVZ 731 | Cargo Ship Stability II | (3-1) | GVZ 834 | Simulator | (2-3) |
| GVZ 734 | Ship Maneuvering and Handling II | (2-1) | GVZ 837 | Meteorology II | (1-1) |
| GVZ 736 | Oceanography | (2-0) | GVZ 841 | Cargo Handling and Stowage II | (3-0) |
| GVZ 739 | Navigation VI | (4-2) | GVZ 845 | Marine Communication II | (2-2) |
| GVZ 742 | Safety at Sea IV | (2-1) | GVZ 848 | Maritime Law II | (4-0) |
| GVZ 748 | Maritime Law I | (4-0) | GVZ 855 | Personnel Management | (2-0) |
| GVZ 749 | Chartering | (2-0) | GVZ 880 | Project | (2-4) |
| GVZ 766 | Turkish II | (2-0) | | | |
| ESP | Ship Owner Business | (2-0) | ESP | Marine Engineering | (3-0) |
| ESP | Marine Insurance | (2-0) | ESP | Maritime Law | (2-0) |
| | | | ESP | Navigation | (3-0) |
| | | | ESP | Personnel Management | (2-0) |

* Credit hours, (Theory-Practice)

** English Language Supported Programme

3. TÜDEV – Chamber of Shipping
Maritime Education Foundation
Courses - 250 students / year

This is a two year course after high school only leading to W/O, and E/O certificates with again 7.03, and 7.04 IMO Model Courses covered relatively for Deck and Engine Departments. Students do not need University State Entrance Examination to attend the courses. Tuition fee is high with Turkish Standards (3000 USD/year. Building is available with staff / laboratory support from ITUMF.

TÜDEV has pioneered the very first private Merchant Maritime Education in Turkey in 1999. It is different than other profit making privets courses. It's the authors wish to see TÜDEV can a private Foundation University in the most near future, carrying out on Education of 4 years after High School, and vastly contributing to Turkish Merchant Maritime Education at the standards of a University.

4. OTHERS - 250 students / year

Recently one or two private instructors of practical seafaring background and no qualified teaching experience with permission granted from the Administration providing 7.03 Special Courses for Radio Officers and for some other ratings with 8 years of Basic Education and 3 years on board experience to be qualified for restricted W/O certificates with the long distance intention of qualification for W/O Certificates. Education is carried out at the facilities of a Merchant Maritime High School for 2000 USD / course tuition fee. The approach is extremely dangerous, not in line with even minimum standards of STCW '95 regarding the number of years of minimum 11 years of basic education required.

As one can observe, there is a rather variety of Merchant Maritime Education in Turkey ranging from the ITUMF et al.. 5 year

very bright University Graduates with good command of English / Computers, educated by top Staff Members at campus atmosphere, with excellent laboratories; training vessel etc.. ready for any international / International employment as W/O; to private education of ratings with 8 years of basic education by individuals aiming for initially restricted, later on full W/O certificates.

D. BASE LINE STUDY, AND THE PREPARATIONS TOWARDS THE XXIST CENTURY MERCHANT MARITIME UNDERGRADUATE EDUCATION CURRICULAS OF TURKEY–

Refer to the Undergraduate Deck program of ITUMF in comparison with IMO Model Course 7.01+7.03 in **Table 4.** (Ref.2)

One does observe that ITUMF covers **3062** hours of courses (7.03+7.01+Turkish Higher Education Mandatory courses) in 4 years plus 840 hours of Maritime English in Prep. Class totalling to 3902 hours.

IMO Model Courses 7.01+7.03 education recommended by IMO (STCW '95) and Turkish Administration totals to **2597** hours.

Similarly, Refer to the Undergraduate Engine program of ITUMF in comparison with IMO Model Course 7.02 + 7.04 in **Table 5.** (Ref.2)

One again does observe that ITUMF covers **3192** hours of courses (7.02+7.04+Turkish Higher Education Mandatory Courses) in four years plus 840 hours of Maritime English in Prep. Class totalling to **4032** hours.

IMO Model Courses 7.01 + 7.03 education recommended by IMO (STCW '95) and Turkish Administration totals to **3008** hours.

When one compares some sample courses from IMO Model Course and ITUMF curriculum such as Mathematics, Physics it

will be clearly observed that the IMO Model Course contents are at Junior High School level with Turkish standards, and should not be re-lectured at that level in a University. Mandatory minimum Turkish Law contents of Calculus or Physics as practised anyway now, should be lectured. Thus, having already studied them before University, some hours of basic courses should be deducted from the IMO required total number of hours.

Moreover, the number of hours required by IMO for professional Maritime courses should be reconsidered to be vastly decreased at ITUMF taking into account the following boundary conditions of STCW '95 Code, Section B-I/8 (Guidance regarding quality standards).

- .1 The mission statement of the institution
- .2 Details of academic and training strategies in use;
- .3 An organization chart and information on the composition of committees and advisory bodies;
- .4 Staff and student information
- .5 A description of training facilities equipment, training vessel, simulators etc..
- .6 An outline of the policies and procedures on:
 - .6.1. student admission
 - .6.2. the development of new courses and review of existing courses
 - .6.3. the examination system, including appeals and resits
 - .6.4. staff recruitment training, development, appraisal and promotion

.6.5. feedback from students and from industry, and

.6.6. staff involvement in research and development

Above, independent evaluation can be carried out experimentally to all 3 categories of Merchant Maritime Education Institutes (the 4th one should be banned since approach is not in line with even minimum STCW 95 standards), and number of hours required for each institution's curricula should be redeveloped; ITUMF et al. needing the minimum number of hours covering the same courses, and may be Group 2 and 3 curricula staying in line with IMO requirements of minimum standards.

Again experimental observations for pilot number of courses should be carried out with a number of students (10 each for example) with different academical backgrounds from each category of institution attending to a certain lecture under the same conditions (staff member, laboratory etc...), and then being tested to observe their comparatively success trends. It is expected that ITUMF at al.. students will comparatively score higher points relative to other students, thus again contributing towards the development of an empirical formula of less hours spent on learning a certain topic.

This experimental approach can be extended to the students with various academic backgrounds from a number of pilot countries in the future as an IAMU - Working Group I Project, eventually achieving an international curriculum calibration scale suitable for all parties concerned; having of course the same curriculum for the students of the same quality and background.

This will yield in the High Standard Merchant Maritime Universities / Faculties of the world being involved with more concise number of hours of curriculum to grasp the same amount of knowledge in relation with Institutes in line with STCW '95 minimum

requirements who might need that many hours (IMO Model Course Hours) to learn the same topic.

Again utilising less hours, more advanced topics can be introduced to quality students compared to a standard student.

Thus, the 35-40 hour / week programs of ITUMF et al. due to the bureaucracy of the Administration tending to keep in line with IMO Model Course tedious hours designed for 14-15 year old cadets of more modest academic backgrounds; can be vastly and effectively reduced to create space for "Dual Major" education during the same period of time within the Faculty, and "DUAL FACULTY Program" of Turkish Higher Education which permits one bright student to graduate from two Faculties of ITU during 5-6 years instead of one at four years. (For example, Maritime Faculty and Industrial Engineering Faculty.)

Also under this renewed conditions, with less hours during the week Turkish Higher Education permits the bright student to take all required courses at a shorter time to graduate 1 semester earlier.

This approach also permits the student to be involved in research, final year project more specializing on his field of interest, and graduating under more optimum, efficient conditions.

E. CONCLUSION –

The authors recommend that, the outcome / results of their approach to design a mathematical / empirical scale regarding the number of hours of undergraduate programs most efficiently required for students of different academical backgrounds which will be presented as a full paper at the First INAUGURAL CONGRESS of IAMU in Istanbul / Turkey during June / July 2000; should be brought to the attention of IMO –

STW subcommittee as a positive approval of which Administrations will widely without hesitation take new liberal measures for each party avoiding very orthodox measures leading to inefficient waste of academical time for some high quality institutes concerned.

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G. APPENDIX – TABLES

TABLE 4 - ITUMF Undergraduate Deck Program in comparison with IMO Model Courses 7.01 + 7.03

TABLE 5 - ITUMF Undergraduate Engine Program in comparison with IMO Model Courses 7.02 + 7.04

H. NOMENCLATURE

| | |
|-------|--|
| STCW | Standards of Training, Certification, and Watchkeeping |
| IMO | International Maritime Organization |
| W/O | Watchkeeping Officer |
| C/M | Chief Mate |
| E/O | Engineering Officer |
| C/E | Chief Engineer |
| ITUMF | Istanbul Technical University, Maritime Faculty |
| CLASS | |
| NKK | Nippon Kaiji Kyokai |
| RINA | Registro Italiano Navale |
| IQNET | International Quality Network |
| KTU | Karadeniz (Black Sea) Technical University |
| TUDEV | Turkish Maritime Education Foundation |
| IAMU | International Association of Maritime Universities |
| STW | Standards of Training, Watchkeeping |

| | |
|------|--|
| IMLA | International Maritime Lecturers' Association |
| MED | Mediterranean |
| UNDP | United Nations Development Programme |
| ITU | Istanbul Technical University |
| IMAM | International Maritime Association of Mediterranean |

TABLE 5 – ITUMF UNDERGRADUATE ENGINE PROGRAM IN COMPARISON WITH IMO MODEL COURSES

| IMO MODEL COURSE 7.04 | IMO MODEL COURSE 7.02 | ITUMF |
|---|-----------------------|---|
| 1. Int. to marine eng. Materials | 18 | 1. Mathematics |
| 2. Basic eng. science | 47 | 2. Physics |
| 3. Mathematics | 100 | 3. Marine chemistry |
| 4. Marine eng. drawing & design Part 1/Part 2 | 60 | 4. Computer programming |
| 5. Industrial chemistry | 30 | 5. Engineering drawing |
| 6. Hand and power tools | - | 6. Workshop |
| 7. Machine tools | 120 | 7. Int. to marine eng g |
| 8. Fabrication, welding, joining , cutting | 160 | 8. Statics |
| 9. Marine engineering maintenance – Part 1 / Part 2 | 120 | 9. English |
| 10. Marine plant operation | - | 10. Physical education |
| 11. Thermodynamics | 84 | 11. Dynamics |
| 12. Mechanical Science | 50 | 12. Marine electrotechnology |
| 13. Int. to marine electrotechnology | 70 | 13. Operation and maintenance of main and auxiliary machinery |
| 14. Int. to ships & ship routines | 24 | 14. Thermodynamics |
| 15. Basic free fighting | 13 | 15. History of Turkish Revolutions |
| 16. Medical emergency – basic training | 6,5 | 16. Material science |
| 17. Personal survival | 10 | 17. Strength of materials |
| 18. Seagoing Phase | ~ 1 year | 18. Fluid machines |
| | | 19. Heat transfer |
| | | 280 |
| | | 112 |
| | | 42 |
| | | 42 |
| | | 112 |
| | | 308 |
| | | 84 |
| | | 28 |
| | | 140 |
| | | 56 |
| | | 56 |
| | | 182 |
| | | 140 |
| | | 84 |
| | | 56 |
| | | 42 |
| | | 56 |
| | | 42 |
| | | 42 |

| | | | | | | | |
|--|-------------|------------|----------------------------|-------|-------|---|-----|
| 19. Marine eng. materials | 28 | - | 14. Life-saving appliances | 11,75 | 18,25 | 20. Marine diesel engines | 224 |
| 20. Marine heat engines | 30 | 6 | | | | 21. Marine auxiliary machinery | 98 |
| 21. Marine electrotechnology | 73 | 43 | | | | 22. Naval architecture | 42 |
| 22. Advanced workshop Practice | - | 200 | | | | 23. Machine design | 42 |
| 23. Operation & maintenance of main and auxiliary machinery | 248 | - | | | | 24. Turkish | 56 |
| 24. Medical emergency – first aid | 12,25 | 7,75 | | | | 25. On board training | |
| 25. Proficiency in survival craft | 11,75 | 18,25 | | | | 26. Steam boilers | 42 |
| 26. Advanced training in fire fighting | <u>28,5</u> | <u>7,5</u> | | | | 27. Steam turbines | 84 |
| | <u>1004</u> | <u>982</u> | | | | 28. Electronics | 42 |
| | | | | | | 29. Automatic control | 42 |
| | | | | | | 30. Management economy | 28 |
| | | | | | | 31. Labor law | 28 |
| | | | | | | 32. Gas turbines | 28 |
| | | | | | | 33. Survey Procedures | 28 |
| | | | | | | 34. Refrigeration | 42 |
| | | | | | | 35. Heating, ventilation and conditioning | 42 |
| | | | | | | 36. Maritime law | 28 |
| | | | | | | 37. Simulator | 70 |
| | | | | | | 38. Final year project | 84 |
| | | | | | | 39. Maritime English | 840 |
| | | | | | | <u>EXTRAS</u> | |
| | | | | | | Introduction to Computer Program | 28 |
| | | | | | | General Aspect of marine eng. | 28 |
| | | | | | | Marine hydraulics | 28 |

| | | |
|--|--|--|
| | | <p>Int. to Naval architecture 28</p> <p>Energy and energy sources 28</p> <p>Energy conversion 28</p> <p>Marine heat engines 28</p> <p>Power plants 28</p> <p>Marine engineering 42</p> <p>Machinacal vibrations of ships 42</p> <p>Personnel management 28</p> <p style="text-align: right;">210</p> <p style="text-align: right;">3192+840</p> |
|--|--|--|

| TABLE 4 – ITUMF UNDERGRADUATE DECK PROGRAM IN COMPARISON WITH IMO MODEL COURSES | | | | |
|---|----------------|--------------------------|--------------------------|-------|
| | ITUMF | IMO MODEL COURSE 7.03 | IMO MODEL COURSE 7.01 | TOTAL |
| 1. Mathematics + Spherical Trigonometry | 224 | 144 | - | 144 |
| 2. Physics + Electronics | 140 | 304 | - | 304 |
| 3. Watchkeeping | 140 | 117 | 48 | 165 |
| 4. Ship Power Plants | 56 | - | 34 | 34 |
| 5. Navigation + Electronic Navigation | 616 | 576 | 187 | 763 |
| 6. Safety at Sea | 154 | 116 | 157 | 273 |
| 7. Ship construction | 28 | 63 | 31 | 94 |
| 8. Ship Stability | 112 | 68 | 106 | 174 |
| 9. Ship Manoeuvring Handling | 70 | 15 | 48 | 63 |
| 10. Meteorology + Oceanography | 70 + 28 | 58 | 33 | 91 |
| 11. Cargo Handling | 98 | 50 | 104 | 154 |
| 12. Maritime Communications | 112 | 105 | 70 | 175 |
| 13. Maritime Law | 112 | - | 87 | 87 |
| 14. Maritime English | PREP 840 + 140 | | | |
| 15. On Board Training | 12 MONTHS | | | |
| 16. Personal Management | 28 | | | |
| | + | | | |
| 1. Chemistry | 42 | | | |
| 2. Statics | 28 | | | |
| 3. Dynamics | 28 | | | |
| 4. Fluid Mechanics | 28 | | | |
| 5. Computers | 42 | | | |
| | | EXTRAS | | |

| | | | |
|------------------------|-------------------|---------------|--|
| 6. Seamanship | 126 | | |
| 7. Physical Education | 56 | | |
| 8. Turkish History | 56 | | |
| 9. Turkish Language | 56 | | |
| 10. Economy | 28 | | |
| 11. Basic Law | 56 | | |
| 12. Chartering | 28 | | |
| 13. Simulators | 70 | | |
| 14. Final Year Project | 84 | | |
| 15. Int. to Naval Arc. | 28 | | |
| 16. Basic Marine Tech. | 28 | | |
| 17. Int to Camp. Prog. | 28 | | |
| 18. Cargo Handling | 42 | | |
| 19. Chartering | 28 | | |
| 20. Shipowner Business | 28 | | |
| 21. Marine Eng. | 42 | | |
| 22. Navigation | 42 | | |
| Shipping | 28 | | |
| Marine Insurance | 28 | | |
| Maritime Law | 28 | | |
| Personnel Management | 28 | | |
| Port Management | 28 | | |
| TOTAL | 3062 + 840 | EXTRAS | |