

**REPORT OF THE XXVIIIth MEETING OF THE FIG/IHO/ICA
INTERNATIONAL ADVISORY BOARD OF STANDARDS OF COMPETENCE
FOR HYDROGRAPHIC SURVEYORS AND NAUTICAL CARTOGRAPHERS**

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**DRAFT REPORT OF THE XXVIII MEETING OF THE FIG/IHO/ICA
INTERNATIONAL ADVISORY BOARD OF STANDARDS OF COMPETENCE
FOR HYDROGRAPHIC SURVEYORS AND NAUTICAL CARTOGRAPHERS**

1. Location and attendance

The XXVIII meeting of the FIG/IHO/ICA Advisory Board was held at and hosted by the National Technical University of Athens, from 25 to 29 April 2005. The following were present :

Capt. Andy Armstrong (Chairman) (IHO)
Mr. Gordon Johnston (Vice-Chairman) (FIG)
Capt. Federico Bermejo (Secretary) (IHB)

FIG Members

Dr. Razali Mahmud
Ms. Tiina Tuurnala
Dr. David Wells

IHO Members

Cdre. Brahma
Dr. Luciano Surace
Dr. Delf Egge

ICA Members

Mr. Ron Furness
Dr. Lysandros Tsoulos

The Chairman welcomed the new member of the Board, Cdre Brahma (India) appointed by IHO in replacement of Cdre Jayaraman who had resigned.

2. Opening of the meeting and adoption of the Agenda

The Rector of the National Technical University of Athens, D. Adreas Andreopoulos and the Chairman of the School of Surveying Engineering Prof. Andreas Georgopoulos inaugurated the meeting and welcomed the Board. The importance of training was stressed, as well as the academic character of the meeting. The Chairman then opened the meeting and the Agenda was adopted.

3. Administrative Arrangements

A conference room and many other facilities were provided by the NTUA. Prof. Tsoulos explained the administrative arrangements and social events scheduled, which included a visit to the University Library and classrooms.

4. Inter-sessional activities

The Board Members and the Secretary reported on the activities related to training and education carried out between meetings. A summary of these activities is given here below:

- a) Recognition of the Course in Hydrography submitted by Bangladesh – The Vice-Chairman explained the procedures followed to finalize this matter and proposed that the course be awarded recognition at Category B level. This was agreed.
- b) Recognition of the Cartographic Course from IMA (Trieste) - Mr. Furness explained that work had been carried out by correspondence and that eventually the course had been awarded recognition at Category A. He also reminded that this upgraded the Category B level recognized in 2004
- c) Recognition of the UKHO Hydrographic Data Processing and Marine Cartography Programme – The Vice-Chairman and Secretary explained that this course had been reviewed by correspondence and the Board members have agreed to award it recognition at Category B level.

d) Other three topics were discussed regarding recognition of courses: the date of issuance of certificates, the delay agreed to submissions and the recognition to modules forming a course. The Board agreed that the date of issuance had to be the date on which the procedures for recognition are finished. It was also agreed that delay in submissions could be admitted, as this practice had been followed in the past, provided justification for the delay is given. Finally, on the recognition of modules, although it was considered an administrative matter of the institutions running courses, the IAB felt that the recognition is given to the total time of all modules of a course together.

The Board also confirmed that the logos of the three organizations could be used in the National Certificates issued by institutions running courses recognized by the IAB.

5. Presentation of the Vice-Chairman

The IAB Vice-Chairman, Mr. Johnston made a presentation, outlining the different qualifications awarded by other international organizations in the field of Hydrography. Especially the cases of IMCA and ACSM. .

It was agreed that the IAB could review the Standards in comparison with the Standards of these organizations and provide assessment on their competence schemes.

It was also agreed that IMCA and ACSM may cooperate to develop the current Option 3 and Option 4 of the Standards.

The Vice-Chairman will write a letter to both organizations offering the advise of the Board on these matters.

6. Pending tasks from the 27th meeting.

Consideration was given to the actions assigned to the Board's members after the 27th meeting. They are explained below:

- 1) Development of a Model Course as a new Appendix.
This task had been commenced by Dr. Wells and it was agreed to finalize it before the next meeting.
- 2) Development of a spreadsheet
 - a. A model was presented by Dr. Wells and will be included in the Standards (M-5) as Appendix 5.
 - b. A Readme will be also included, showing the use of the spreadsheet.
 - c. The Final model of the Spreadsheet will form Appendix 5 to the present M-5. It will be developed as soon as possible after the meeting and passed to the Board members for comments.
- 3) Reviewing of Chapter E3 (see this under 6 below)
- 4) Development of an IAB Strategic Plan (see this under 11 below)
- 5) Development of a new Review Form.
 - a. Mr. Furness presented the new model for the Review Form that was endorsed by the IAB (See Appendix V)
- 6) Reviewing the consistency between M5 and M8.
 - a. Ms. Tuurnala and Prof. Tsoulos completed this task. It was decided to keep the same wording used in paragraph 3.2. of M-5 for M-8. Also, paragraph 2.3.1 of the Preamble to M-8 was amended (See Appendix I)
- 7) Development of new Option "Resource Assessment and Management".
 - a. This task will be completed by the Chairman who will propose a draft in the intersessional period.

7. Review of M-5 “Standards of Competence for Hydrographic Surveyors” and M-8 “Standards of Competence for Nautical Cartographers”

The Board examined a set of amendments proposed by the Board members and, after endorsement, were incorporated to the Standards. (See Appendix I)

8. Review of courses

1. Course In Hydrography for Naval Officers of the Indonesian Navy (SEHIDRAL)

The Board was assisted in the reviewing by Capt. Sugito and Capt. Agoes Widagdo.

The Board recognized the considerable time devoted to prepare the submission and thanked the Indonesian Hydrographic School for its effort.

The Board reviewed the submission for re-recognition at Category B level but was unable to proceed conclusively due to some factors that were highlighted in a letter sent to the Indonesian Hydrographer. The recommendation of the Board was to re-submit the requested documents within three months to allow the Board to complete review and award recognition as soon as practicable. In the meantime, the existing certificate will remain valid.

2. Course of Hydrography for Naval Officers of the Spanish Hydrographic School

The Advisory Board was assisted in the course review by Cdr. Carlos Gamundi from the Spanish Hydrographic Office, who answered some questions from the Board. The IAB decided to confirm the recognition of this course at Category A with Options 1 and 6. Before issuance of the certificate, the Spanish Hydrographic School will be asked to provide some supplementary information concerning some minor items.

9. Updating of Publication M-6

The Board re-affirmed that M-6 "List of Reference Texts" was a valuable publication and asked the Vice-Chairman and Secretary to investigate the possibility to convert the publication into a data base and upload it in the IHO Web Page with possibility of direct access from the Board members to update it permanently.

The Chairman will write a letter to the IHB Directing Committee asking that this task be carried out by the IHB.

10. Consideration of the Category C courses

The Board discussed the document introduced by the Dr. Wells “Notional Category C Competencies” written by T.D. Taylor (NAVOCEANO) and R.T. Brennan (NOAA), as well as some indications given in a letter from the IHB Director and former Chairman of the IAB Capt. Gorziglia about such a Category. Capt. Gorziglia remarked that the present Cat A and B levels do not satisfy the needs of some countries to train and motivate some “crew” with basic level and therefore they are establishing very basic courses for that purpose.

This document was considered along a proposal from the Vice-Chairman about Individual Recognition. The advice of the IAB was that competence should be limited to Hydrography and Cartography but not to technicians and that it was worthwhile to develop Guidelines for Other Training Programmes (The present Standards consider Cat A Programmes, Cat B Programmes and “Other programmes”) to include as an Appendix to the Standards.

A Working Group formed by the Chairman, the Vice-Chairman, Dr. Wells and the Secretary was

established with the task to provide Draft Guidelines on this topic. The proposal from the Vice-Chairman on Individual Recognition will be a working document to be considered by the Working Group.

Another point of study for the Working Group will be the provision of certificates to the attendants to modules of a programme (see paragraph 4 d.). A letter will be written to Mr. Taylor on this matter.

11. Any Other Business

The Vice-Chairman presented a Draft Strategic Plan for the IAB which was carefully studied by the members. Among the most relevant points addressed during the discussion of this topic were:

- The funding of the Board's members to attend meetings. This is a problem that has not been solved as the initiative taken during the 26th meeting to study the establishment of a fee for recognized courses had not been followed up.
- The need for a Working Programme for the Board
- The need for a more close follow-up of certain matters between meetings.

It was decided that a Working Team formed by The Chairman, Vice-Chairman, Mr. Furness and Secretary will study the development of the above items and any other that may be relevant and will produce a draft document by the end of October. It was also agreed that the Chairman, Vice-Chairman and Secretary may meet in the intersessional period if necessary to ensure the correct follow-up of urgent matters.

12. Date/Venue of the next meeting

Confirmation was given by Cdre Brajhma to the previous schedule for the 2006 meeting in Goa (India). The dates for the meeting were fixed from 10 to 14 April.

Confirmation was also given to the rest of the schedule as follows:

2007 – Hamburg (Germany)
2008 – Sydney (Australia)
2009 – Helsinki (Finland)
2010 – New Orleans (USA)

This schedule must be considered as provisional and will require confirmation every year.

12. Close of the meeting

The Chairman closed the meeting at 1515 on 3 May 2005.

APPENDIX I. CHANGES TO M-5 AND M-8
(See also Appendix IV)

Standards of Competence for Nautical Cartographers (M-8)

Preamble

Paragraph 2.3.2.

Change to read

“2.3.1. **Specialism 1 – Electronic Navigational Chart (ENC)** – the preparation of data, the composition of ~~nautical charts~~ electronic navigational charts and their production, including ENC distribution and maintenance.” ~~whether manually or utilizing computer-assisted methods including the management of cartographic data in a digital environment.~~

Paragraph 3.2. **Documentation to be submitted**

Change the present paragraph 3.2. by the following 3.2.1 and 3.2.2.
(Note: This change is for consistency between publications M-5 and M-8)

“The following information must be included in all submissions:

3.2.1 Information about the programme infrastructure. Each item in the following list should be described in the first Chapter of the submission.

a) Programme identification:

Name of the Programme:

Institution submitting the Programme for recognition:

Recognition sought: Specify

Category A:

Category B:

Standard against which recognition is sought:

M5 Ninth Edition [2004]

M8 First Edition [2003]

M5 Options offered: 1 2 3 4 5 6 7

M8 Specialisms offered: 1 2 3

Language(s) in which the Course is given:

b) Aims of the programme:

(provide a narrative paragraph)

c) Entry requirements:

Qualifications required for entry:

Entry exemptions that may be given:

Alternative qualifications that may be acceptable for entry:

NOTE: For programmes seeking exemption of some or all the basic subjects, provide a clear indication of where students would previously have attained that knowledge, and a clear description of the formal procedures used to evaluate such exemptions. With regard to the pre-entry requirement for admission to any educational or training programme, the prospective student for a Category A

programme should have a deeper theoretical ability in mathematics and applied physics than the candidate for a Category B programme.

c) Programme capacity:

Expected (actual) number of students beginning the programme each year.

For multi-year programmes, the expected total number of students progressing through the programme.

d) Staff list: For each instructor in the programme, provide a brief résumé, listing subjects in the programme, for which they are responsible;

Academic qualifications (degrees, etc..)

Hydrographic experience

Authorships

e) Facilities available to students:

Equipment: provide list

Software: list specific software (with emphasis on hydrographic and cartographic software packages)

Training aids:

Laboratories:

Training vessels:

Library. List:

- total number of volumes held,
- approximate number of hydrographically-relevant volumes,
- other media available (e.g. charts, maps, audio-visual resources)

f) Programme structure:

- Total duration of the Programme (in weeks or months or years).
- Table of programme modules (individual courses). For each module, identify where in the sequence of module it is to be taken by students,
- The duration (in weeks) of the module and
- The total number of lecture hours, supervised practical exercise hours, and unsupervised practical exercise hours (individual or team project hours) expected from an average student for that module.

3.2.2. Information about each module (course) in the programme.

- a. The programme being submitted should be described in more detail than the M-8 Syllabus (Section 6), with a tabulation of contact of hours devoted to M-8 Syllabus subjects. In the tabulation, a distinction should be made between lecture hours, guided exercise hours, and – if significant amounts of learning are expected to occur outside scheduled class hours – the estimated out-of-class hours. The M-8 Syllabus needs not to be considered as the most appropriate structure for a particular programme.
- b. Representative examination papers covering all subject areas from the previous two years, which are taken by students during the programme (i.e. not only the final examination), showing the marking scheme and pass marks. This should not be taken as precluding newly developed programmes not yet able to satisfy these items.
- c. A list of texts and reference material used for each subject area, with an indication of the editorial house/publisher, and year of publication.
- d. Details of Practical Exercises as detailed in 2.5.1.
- e. Details of Field Training Projects as detailed in 2.5.2.

3.2.3. Cross-reference Table.

This table is the most important information used by the Board to assess submitted courses? What this table contains is a map of the hours devoted to each topic in each course module described in 3.2.3, classified according to which M-8 Syllabus topic they are related to. A spreadsheet to be used as a template is provided on the IHO website. This template should be used and filled in by the submitting agency.

**APPENDIX I
CHANGES MADE TO THE SYLLABUS**

E4.2 Hydrographic specifications					
(a) Instrumentation	DF	Compare specifications of bathymetric systems (single beam echo-sounders, multibeam echo-sounders, interferometric sidescan sonar, and Lidar). Describe oceanographic, geophysical (seismic, magnetometer, and gravimetric) and geotechnical equipment. Explain the importance of the correct installation and determination of the attitude and position of each sensor.	Specify the appropriate bathymetric, oceanographic, geophysical and geotechnical equipment required, for specific applications. Specify and evaluate appropriate location of sensors		
E4.4 (a) Radio data telemetry links	P F	Explain the differences in telemetry range and data capacity of various carrier frequencies and operational parameters (e.g. signal strength, water column, terrestrial or satellite path, modulation technique used). Describe data telemetry for emergency use (GMDSS), telemetry of survey data (water level gauges, calibration and position data). Describe "in field" data telemetry applications and methods, and ship to shore data telemetry applications and methods.	Install and operate appropriate data telemetry links for specific applications.		
(b) Acoustic data telemetry links	F _		Explain and describe the Bust, Pulsed and Spread spectrum signal structure.		
E4.5 Digital signal processing	F _		Describe basic digital signal and image processing concepts as applied to hydrographic data.		
E5.4 Data presentation					

(c) Electronic Chart.	FF	Describe Electronic Navigational Charts (ENC), and Electronic Chart Display and Information Systems (ECDIS) (concepts, components, impact on hydrography).	Describe the production process of ENC. Explain ENC distribution and maintenance methods		
E3.1 Geodesy					
(a) Introduction to Geodesy	FF	Describe the shape of the Earth and explain the ellipsoid of revolution and its relationship to the Geoid. Describe the principles of gravity models.	Describe the nature of the gravity field, how it is measured, monitored and modelled, together with associated uncertainties. Explain the role of the gravity field in hydrography and in particular in obtaining predicted bathymetry from satellite altimetry.		
(b) Co-ordinate Systems for Positioning	PF	Define the celestial sphere and other astronomical terms including sidereal and solar time. Describe geodetic, astronomic, orbital and geocentric systems. Describe the Conventional Terrestrial System and some of its practical realizations, such as GRS80, WGS84 etc.	Calculate transformations between co-ordinate reference systems. Define various realizations of solar time, such as UTC TAI, GPS time etc.		
(f) Map Projections	DP	Distinguish between conformal and non-conformal projections. Classify the properties of cylindrical, zenith and conic projections. Describe grids and graticules on projections. Transform between geographic and grid coordinates, compute convergence, scale factors and arc to chord corrections, using appropriate software.	Verify computed values for a number of parameters including scale factor, convergence and arc to chord corrections. Select an appropriate projection for a specific application.		
E3.3 Vertical positioning					
(c) Elevation measurements and computations	DP	Describe methods for determining differences in elevation (e.g. by spirit level, vertical angle, and GNSS). Compute elevations from observed data. Correct for effects of curvature and refraction, where appropriate. Describe the principles of satellite altimetry..	Compare and evaluate the observing methods and procedures for the determination of elevation (e.g. by spirit level, theodolite, and satellite systems). Select an appropriate system for specific applications. Describe how bathymetry can be predicted from satellite altimetry.		

E 3.5 Three-dimensional Geodesy	DP	Describe the mathematical model for 3D geodesy, integrating satellite and terrestrial observations.	Evaluate a typical hybrid network, using commercial software. Describe application of 3D Geodesy to hydrographic survey control and 3D positioning of survey vessels.		
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APPENDIX II

LIST OF MEMBERS OF THE BOARD

NAME	Country	ADDRESS	PHONE	FAX/ e-mail
Capt. Andy ARMSTRONG (IHO) Chairman	USA	University of New Hampshire Joint Hydrographic Center Océan Engineering Lab 24 Colovos Road Durham, NH 03824	(603) 862 4559	603 862 0839 andy.armstrong@unh.edu andy.armstrong@noaa.gov
Mr. Gordon JOHNSTON (FIG) Vice-Chairman	U.K.	67 Devon Road Cheam Surrey England, SM2 7PE	(44)(0) 208 661 1650 (44) (0) 7966 937369	gordon.johnston1@orange.net
Capt. Federico BERMEJO Secretary (IHB)	Monaco	International Hydrographic Bureau 4 Quai Antoine 1er BP 445 MC 98011 Monaco Cedex	(377)-93-108107	(377)-93-108140 fbermejo@ihb.mc
Cmde. L. BRAHMA (IHO)	India	National Hydrographic Office 107-17 Rajpur Road Post Box 75 DehraDun India	0091 – 135 – 2748748(0) 0091-135-2742598	nho@sancharnet.in 0091-135-2748373
Dr. Delf EGGE (IHO)	Germany	Hamburg University of Applied Sciences Dept. of Geomatics Hebebrand str 1 D-22297 Hamburg	(49) (40) 428755366	(49) (40) 428755399 d.egge@rzcw-haw-hamburg.de
Mr Ron A FURNESS (ICA)	Australia	93 Ashworth Avenue Belrose 2085. Representative; Asia Pacific IIC Technologies Inc.	61 2 9451-9003 61 405 576 196 (mobile)	61 2 9975-3169 rfurness@ozemail.com.au
Dr. Mohd RAZALI Mahmud (FIG)	Malaysia	Faculty of Geoinformation Science & Engineering University Teknologi Malaysia 81310 UTM Skudai Johor Darul Ta'zim	607 5530827	607 5566163 razali@fksq.utm.my
Dr. Luciano SURACE (IHO)	Italy	Istituto Idrografico della Marina Passo Osservatorio 4 16100 Genova	39 010 2443363	39 010 2443364 luciano.surace@libero.it
Dr. Lysandros TSOULOS (ICA)	Greece	Assoc. Professor NTUA Cartography Laboratory National Technical University of Athens 9 H. Polytechniou	30 210 7722730	30 210 7722734 lysandro@central.ntua.gr

		Zographou 15780 Athens Greece		
Ms. Tiina TUURNALA (FIG)	Finland	Director Hydrographic Department Finnish Maritime Administration P.O. Box 171 FIN-00181 Helsinki Finland	(358) 204484426 GSM 358405476762	358 204484620 Tiina.tuurnala@fma.fi
Dr. David WELLS (FIG)	Canada	538 Squires Street Fredericton New Brunswick E3B 5A3	(1)-506 4542650 May to Dec (1) – 228 6883389 Dec to May	(1)-506-4540352 (May to Dec) dew@unb.ca (1)- 228-688-1121 (Dec to May)

APPENDIX III**(Only for the Members of the Board)****LIST OF ACTIONS FOLLOWING THE 28th MEETING**

Action	Responsible
Letter thanks Rector NTUA AND chairman Hydrographic Dept.	Chairman
Letters to Indonesia, Spain and Bangladesh	Done
Letter from Chairman to IHB D.C. on the above matter	Secretary, Chairman
Letter responding Capt. Gorziglia	Chairman
Letter responding T. Taylor	Dave
Letter responding IMCA	Vice-Chairman
Letter responding questions raised by Peter Westcott (UKHO)	Chairman
Updating M5 and M8	Done. Secretary to update
Draft new Option Resource Assessment and Management	Chairman to produce draft and circulate
Amend List of addresses and circulate	Secretary
Refine Appendix 5 (Spreadsheet) upload it in the IHO Web Page and create hyperlink	Dave + Secretary
Send certificates recognition to Bangladesh and Spain	Secretary.
Send letters reminding resubmission to IMA, Argentina, Malaysia and Australia (Melbourne)	Chairman
Reviewing of M8. Applicability of M4 and other IHO publications	All (Before next meeting)
Develop new Appendix 6 to M5 and M8 "Guidelines for Unclassified Programmes"	Chairman, Vice-Chairman, Dave, Secretary.
Develop framework for IAB Strategic Plan and Work Programme before October 2005	Chairman, Vice-Chairman Ron, Secretary
Investigate conversion of M6 to data base format. Updating structure and content of M6. Propose new entries or deletions.	Vice-Chairman, Secretary, All

APPENDIX IV

Paragraph 3.2.4 of M-5 STRATEGIC PLAN

An institution (or organization) submitting a course for recognition must include an outline plan for its department and teaching of the course for a period of 5 years. This strategic plan should not include sensitive financial or other confidential matters but outline as a minimum the following:

How the institution will maintain or develop the number of pupils and the course infrastructure

Stay up to date with technology developments

The approach for the replacement of staff through succession planning

Outline description of any areas of research

Other major influences and dependencies may also be included. The IAB wishes to receive, after a period of 5 years, an update to this plan as a contribution to the continued recognition of the course.

APPENDIX V

PROPOSAL REGARDING INDIVIDUAL RECOGNITION

Recognising the current interest and concern regarding the status of individuals in Hydrography:

Proposed statements, actions or strategy:

1) The IAB wishes to undertake a pilot development of common elements with a Competency or Field Proficiency Scheme reporting back **in 2006** (pilot with IMCA)

2) The IAB shall review and develop a strategy in relation to Competency or Field Proficiency Scheme for Individuals. **By 2006 meeting.**

3) Upon the findings of 2) the IAB shall develop:

a. New guidelines and or minimum Standards for such schemes

Or

b. adopt a recognition process for such schemes. **By end 2006.**

4) Take positive steps to ensure that Capacity Building's relevant schemes are notified to the IAB via communication to FIG, IHO and ICA as well as direct communication with any known initiatives.
From 2006 meeting onwards

APPENDIX VI

**REVIEW FORM
FIG/IHO/ICA ADVISORY BOARD ON STANDARDS OF COMPETENCE FOR
HYDROGRAPHIC SURVEYORS AND NAUTICAL CARTOGRAPHERS**

PRELIMINARY REVIEW (PRIOR TO BOARD DISCUSSION)

REVIEWER:

COURSE TITLE :

SUBMITTING ORGANIZATION :

BACKGROUND:

STATUS : CATEGORY : OPTIONS :

LANGUAGE OF INSTRUCTION:

DOCUMENTATION

Information about the programme infrastructure

Programme Identification

Aims of the programme

Entry requirements

Prior knowledge if exemptions claimed

Programme capacity

Staff list

Facilities available to students

Programme structure

- Lecture**
- Field**
- Lab**
- Outside study**

Information about each module (course) in the programme

Cross – reference table

Bibliography

SUMMARY COMMENTS:

Is documentation provided adequate?

If NO then what prevents you from recommending that recognition be awarded – please qualify comments.

CONCLUSIONS

Can Course be accredited without further information being sought?

Attach a draft list of points requiring clarification or amplification.

Attach a draft list of points not covered where appropriate.

Signature and Date

APPENDIX VII

LIST OF RECOGNIZED COURSES HYDROGRAPHY May 2005

COURSE	Cat.	Specialism or Options	Initial date of recognition Edition of Standards	Date of re-recognition Edition of the Standards	Language	Date Rec. expires
1. Port Hydrography Course of Bordeaux University, France.	B	Op. 2	1989 5 th	2001 8 th	French	2011
2. Course Programme in Geomatics and Hydrography of the Hamburg University of Applied Sciences	A	Op. 1	1990 5 th	2001 8 th	German (Dipl.-Ing.) English (Master)	2011
3. L'Ecole Nationale Supérieure des Ingénieurs des Etudes et Techniques d'Armement (ENSIETA) of the "SHOM" France.	A	Op. 1 & 5	1980 1 st	1991 5 th 2001 8 th	French	2011
4. Australian Navy Course for Surveying Assistant Fourth Class (H4)	B	1	1981 2 nd	1991 6 th	English	2001
CANCELLED (See course N° 41)						
5. Specialization Course in Hydrography of the Chilean Hydrographic and Oceanographic Service.	A	Op. 1,2	1991 5 th	2000 8 th	Spanish	2010
6. Course in Hydrography for Naval Officers of Brazilian Navy	A	Op. 1	1992 5 th	2002 9 th	Portuguese	2012
7. Specialization Course in Hydrography of the Portuguese Naval Hydrographic Institute	A	Op. 1, 2	1983 2 nd	1993 6 th 2003 9 th	Portuguese	2013
8. Advanced Training Course On Hydrography For Officers - Epsom (France)	B	-	1983 2 nd	2003 9 th 1994 6 th	French	2013
9. Intermediate Hydrography and Oceanography Course of the Hydrographic Institute of Portugal.	B	Op. 1, 2	1984 3 rd	1994 6 th 2004 9 th	Portuguese	2014
10. Course in Hydrography for Naval Officers of Indonesian Navy (SEHIDRAL)	B	Sp. 1, 2	1993 6 th		Bahasa Indonesia	2004
11. Course in Hydrography for Naval Officers of Peruvian Navy	B	Op. 1, 2, 5 & 7	1994 6 th	2004 9 th	Spanish	2014
12. Basic Hydrographic Course at the Royal Naval (UK) Hydrographic School, HMS Drake. (SEE COURSE N° 42)						
13. Coastal Zone Management Hydrographic Survey Diploma. Chilean Maritime University. UMACH	B	Sp. 2	1994 6 th		Spanish	2004
CANCELLED						

14. Course in Hydrography. International Maritime Academy of Trieste, Italy.	B	Sp. 1	<u>1994</u> 6th		English	2004
15. Specialization Course of the Spanish Hydrographic Institute.	A	Sp. 1	<u>1985</u> 3 rd	<u>1995</u> 7 th <u>2005</u> 9 th	Spanish	2015
16. Course in Hydrography (HYDRO I) of the University Teknologi Malaysia.	B	Sp. 2	<u>1995</u> 7th		English	2005
17. Course in Hydrography for Naval Officers of the Argentine Navy	B	Sp. 1	<u>1996</u> 7th		Spanish	2006
18. Course in Hydrographic surveying of the Department of Geometrics & Geomatics of the University of Melbourne (Australia)	A	Sp. 1	<u>1996</u> 7th		English	2006
19-Year Course Programme of "Hogere Zeevaartschool", Amsterdam.	A	Sp. 1, 2, 3	<u>1982</u> 2 nd	<u>1997</u> 7th	Dutch	2007
20. Specialization Course of the Italian Hydrographic Institute.	A	Sp. 1	<u>1986</u> 4 th	<u>1997</u> 7th	Italian	2007
21. Hydrographic Course of the Japanese Maritime Safety School.	B	Sp. 1	<u>1987</u> 4 th	<u>1997</u> 7th	Japanese	2007
22. Course in Hydrography for Petty Officers of the Spanish Hydrographic Institute	B	Sp. 1	<u>1997</u> 7th		Spanish	2007
23. Course in Hydrography of the "Academy Admiral Makarov, Russia"	A	Sp. 1, 2, 3	<u>1997</u> 7th		Russian	2007
24. Basic/Long Hydrographic Specialist Course of the Indian National Hydrographic School, Goa	A	Op. 1,2,3,4	<u>1982</u> 2 nd	<u>1997</u> , 7 th <u>1998</u> , 8 th	English	2008
25. Group Training Course in Hydrographic Survey, Japan.	B	Sp. 1	<u>1988</u> 5 th	<u>1998</u> 7th	English	2008
26. Course in Hydrography from the University of Technology of Malaysia (UTM)	A	Op. 2, 5, 7	<u>1998</u> 8 th		English	2008
27. Course in Hydrographic Surveying of the University of Plymouth, U.K.	A	Op. 1	<u>1987</u> 4 th	<u>1999</u> 8th	English	2009
28. Advanced Course in Hydrography of the Maritime Safety Academy, Japan.	A	Op. 1	<u>1989</u> 5 th	1999 8 th	Japanese	2009
29. Basic + Long Hydrographic Courses at the Royal Naval (UK) Hydrographic School, HMS Drake.	A	Op. 6	<u>1993</u> 6 th	<u>1999</u>	English	2009
30. Free Course in Hydrography of the National Hydrographic School, Goa, India	B	Op. 1, 2, 3 and 5	<u>1999</u> 8 th		English	2009
31. International Hydrographic Management and Engineering Program of the Naval Oceanographic Office (USA)	B	Op. 1	<u>1999</u> 8th		English	2009
32. Course in Hydrography of the St. Petersburg Naval Academy (Russia)	A	Sp. 1	<u>1999</u> 7 th		Russian	2009
33. Joint International Hydrographic Applied Science Program of the University of Southern Mississippi-NAVOCEANO (USA)	A	Op. 1 and 5	<u>2000</u> 8 th		English	2010

34. Harbour and Coastal Management addressed to Harbour and Coastal Surveyors of the International Maritime Academy (IMA), Trieste.	B	Op. 2	2000 8 th		English	2010
35. Hydrographic Surveyors Programme of the Naval Academy of Colombia	A	Op. 1	2001 8 th		Spanish	2011
36. MSC in Hydrographic Surveying of the University College of London/ Port of London Authority	A	Op. 1 & 2	2001 8 th		English	2011
37. Graduate Programme in Ocean Mapping of the Joint Hydrographic Center/ University of New Hampshire (UNH) and National Oceanic and Atmospheric Administration (NOAA), USA	A	-	2001 8 th		English	2011
38. LSGI Hydrographic post-graduated Diploma of the Polytechnic University of Hong-Kong	A	-	2001 8 th		English	2011
39. Hydrographic Education Programme of the University of Otago (New Zealand)	A		2002 9 th		English	2012
40. Programme for Bachelor of Engineering Degree in Hydrography of the Dalian Naval Academy (China)	A	Op 1,2,3,4,5,6	2002 9 th		Chinese/ English	2012
41. Royal Australian Navy H2 Hydrographic Surveying Course	B	Op. 1 & 6	2002 9 th		English	2012
42. UK Royal Navy HM2 Course.	B	Op. 6	2003 9 th		English	2013
43. Programme For National Diploma In Hydrography Of The Dalian Naval Academy Of China	B	Op 1,2,3,4,5,6	2003 9 th		Chinese/ English	2013
44. Basic Hydrographic Course of the Bangladesh Navy	B	Op. 1	2005 9 th		English	2015

LIST OF RECOGNIZED COURSES**CARTOGRAPHY**

1. Programme for Bachelor of Engineering Degree in Nautical Cartography from the Dalian University, China	A		<u>2004</u> 1st		English	2014
2. Model Course in Nautical Cartography of the International Maritime Academy, Trieste (Italy) (A		<u>2005</u> 1st		English	2015
3. UKHO Hydrographic Data Processing and Marine Cartography Programme	B		<u>2005</u> 1st		English	2015