

INTERNATIONAL HYDROGRAPHIC  
ORGANIZATION



ORGANISATION HYDROGRAPHIQUE  
INTERNATIONALE

Dossier du BHI No. TA-6

LETTRE CIRCULAIRE 89/2004  
16 Décembre 2004

**CINQUIEME COURS DE "CARTOGRAPHIE MARINE"  
A L'ACADEMIE MARITIME INTERNATIONALE (AMI)  
DE TRIESTE, ITALIE  
(13 avril – 07 décembre 2005)**

Monsieur le Directeur,

L'Académie maritime internationale (AMI) de Trieste a informé le BHI, pour le compte des autorités italiennes; qu'un cinquième cours de "Cartographie marine" était prévu en 2005.

Le cours, qui débutera le mercredi 13 avril 2005 et se terminera le 7 décembre 2005, est prévu pour 12 étudiants originaires de tous pays.

Il est demandé aux autorités gouvernementales, responsables de l'Hydrographie, d'adresser les dossiers de candidature à :

**L'ACADEMIE MARITIME INTERNATIONALE (AMI),  
via Eduardo Weiss 15, 34127 Trieste,  
Italie**

**Téléphone: +39 040 350829, Fax: +39 040 350322 et E-mail [imoima@imoima.org](mailto:imoima@imoima.org)**

par l'intermédiaire de l'AMBASSADE ITALIENNE de leur pays, avec copie au:

**Bureau hydrographique international (BHI)  
4 Quai Antoine 1<sup>er</sup> B.P. 445 MC 98011 Monaco CEDEX  
Principauté de Monaco  
Téléphone: +377 93108100 Fax +377 93108140 E-mail [info@ihb.mc](mailto:info@ihb.mc)**

**Les candidatures non communiquées par l'intermédiaire des Ambassades italiennes ne seront pas acceptées,**  
et ne seront donc pas prises en considération lors de la sélection.. **Les candidatures doivent parvenir à l'AMI,**  
**le 28 février 2005 au plus tard.**

L'AMI prendra en charge le voyage, les frais de transport local à Trieste, ainsi que ceux afférents à l'hébergement et aux repas. Les autres dépenses personnelles, **(argent de poche) seront supportées par l'AUTORITE NATIONALE de chaque étudiant (voir Annexe 2, page 3).**

De par ses objectifs, sa durée, et son contenu technique, ce cours revêt une grande importance. L'on espère que la communauté hydrographique et, notamment les Instituts hydrographiques européens, apporteront leur soutien à l'AMI en détachant des conférenciers, en fonction des demandes que l'AMI adressera directement à chaque pays.

Des informations sur le programme du cours et sur la logistique sont fournies dans l'Annexe 2. Un exemplaire du formulaire de candidature est également joint (Annexe 3).

Veillez agréer, Monsieur le Directeur, l'assurance de ma haute considération,

Pour le Comité de direction,

A handwritten signature in blue ink, appearing to be 'H. Gorziglia', written in a cursive style.

Capitaine  
de vaisseau Hugo GORZIGLIA  
Directeur

- Annexe 1 - Liste de distribution
- Annexe 2 - Détails du cours et logistique (*en anglais seulement*)
- Annexe 3 - Formulaire de candidature et formulaire d'acceptation (*en anglais seulement*)

**LISTE DE DISTRIBUTION**

- Tous les Etats membres de l'OHI
  - Etats non membres de l'OHI, tels qu'ils apparaissent dans l'Annuaire de l'OHI;(y compris les Etats en attente de la qualité de membre)
  - Organisation maritime internationale, Division de la coopération technique, M. David Edwards, 4 Albert Embankment, Londres SE1 7SR (Royaume-Uni)
  - Commission européenne, Direction générale de l'énergie et des transports, M. Roberto Salvarani, M. F. Karamitsos
  - Académie maritime internationale, Trieste (Italie)
  - Ministère italien des Affaires étrangères, Direction générale pour la coopération en matière de développement, Piazzale della Farnesina 1, 00194, Rome (Italie)
  - Ministère italien des Affaires étrangères, DGCS Ufficio IX, viale Tiziano 80, Rome (Italie).
  - Dr. Riccardo Illy, Président de la Région Friuli-Venezia Giulia, Via Carducci 6, 34133 Trieste (Italie)
  - Dr. Lodovico Sonogo, Assessore Regionale ai Trasporti , Région Friuli-Venezia Giulia, via Giulia 75/1, 34125 Trieste (Italie)
  - Prof. Domenico Romeo, Magnifico Rettore, University of Trieste, Piazzale Europa 1, 34100 Trieste (Italie)
  - Président de la Province de Trieste, Piazza Vittorio Veneto 4, 34132 Trieste (Italie)
  - Président de l'Autorité portuaire de Trieste, Punto Franco Vecchio, 34135 Trieste (Italie)
  - Président de la Chambre de Commerce de Trieste, Piazza della Borsa 14, 34100 Trieste (Italie).
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## DETAILS OF THE COURSE

### ▪ Aim of the course

The aim of the course is to train nautical cartographers, to be employed at Hydrographic Services and at other cartographic bodies, able to perform the following:

- Elaborate a cartographic scheme in accordance with local coastal morphology, maritime traffic and port features;
- Plan a new chart scheme, selecting proper projection size and scale, in accordance with pertinent cartographic scheme;
- Evaluate extant hydrographic and topographic data, in order to produce charts with both traditional and electronic systems;
- Compile a new chart, using traditional means as well as computer aided cartographic systems, in compliance with INT specifications;
- Acquire working knowledge of photomechanical and printing techniques, in order to be able to understand and evaluate issues connected with the production of traditional charts;
- Convert a traditional chart into an electronic chart, by digitising existing traditional charts in the standard format or alternatively, verifying – when necessary – a third party's digitisation;
- Acquire basic knowledge of the structure of geographically defined relational databases
- Update charts in both traditional and digital formats;
- Acquire awareness of legal aspects connected with nautical cartography

### ▪ Attendees (entry requirements)

Course applicants should belong to a Hydrographic Service or to other related National Cartographic Services responsible for nautical cartography and should at least hold the following requirements:

- four years service at a National Hydrographic Office or related National Cartographic Service and in addition an acceptable University Degree or a CAT B Course in Hydrography or Cartography.
- strictly relevant professional experience
- English language competence
- computer skills.

The selection of the students will be carried out by the Commission IHB – IMA which will examine case by case the curricula.

### ▪ Number of participants

In order to ensure maximum didactic efficacy, classes should not exceed 12 students.

### ▪ Languages

The course will be held in English

### ▪ Course certificate, diploma

The model course was produced by an international Working Group, with the co-ordination of the IMA and the supervision of the IHB.

The course was submitted to the FIG – IHO Advisory Board to obtain recognition “A” level.

Upon successful completion of the course, a document will be issued by the IMA certifying that the holder has successfully completed a course in Nautical Cartography.

### COURSE OUTLINE

The duration of the course will be 35 weeks. Lessons will be, generally, 7 hours per day, from Monday to Friday, for a total number of 1240 hours.

The course has been subdivided into the following 15 modules.

Every module contains specific segments which are developed taking into consideration the requirement of the course and the time allocated.

Most modules end with a practical project. All aspects will be evaluated and will be used for determining the final course work.

Tests will be given on completion of the following modules: basics, geodesy, chart projections, databases, GIS applications, legal administrative aspects (Law of the Sea – Delimitations).

Term examinations will be conducted on conclusion of modules 8 and 15 and will be used together with the test marks and project marks, to determine the following formula:

$$\text{Term Mark} = [(\text{Avg Test Mark} + \text{Avg Project Mark}) \times 40/100] + (\text{Term Exam Mark}) \times 60/100.$$

#### MODULES

Subject Area	Hours	Subject Area	Hours
<b>1. General .....</b>	<b>10</b>	<b>5. Marine Geography.....</b>	<b>35</b>
1.1 Introduction.....	2	5.1 General Geography of the Earth.....	4
1.2 International Organisations.....	4	5.2 Marine Geology and	
1.3 National Organisations.....	4	Sedimentology.....	12
<b>2. Basics.....</b>	<b>209</b>	5.3 Methods and Instrumentation used	
2.1 Mathematics and Statistics.....	80	by marin geologists.....	7
2.2 Information Technology and		5.4 Oceanography.....	12
Communication.....	100	<b>6. Navigation.....</b>	<b>35</b>
2.3 Grid Computation.....	21	6.1 General Principles.....	7
2.4 Project 0.....	8	6.2 Types of Navigation.....	4
<b>3. Geodesy.....</b>	<b>70</b>	6.3 Systems and Methods.....	7
3.1 General figure of the Earth.....	7	6.4 Port and Coastal Traffic Control.....	3
3.2 Geometrical Foundations related to the		6.5 Project 3.....	14
Geodetic Reference Ellipsoid.....	21	<b>7. Nautical Charts.....</b>	<b>6</b>
3.3 Geodetic Datums and Datum		<b>3</b>	
Transformation.....	21	7.1 Introduction.....	6
3.4 Fundamentals of Three -Dimensional		7.2 Definitions.....	6
Geodesy.....	14	7.3 Specifications.....	14
3.5 Project 1.....	7	7.4 Chart Schemes.....	9
<b>4. Chart Projections.....</b>	<b>70</b>	7.5 Production Systems and	
4.1 General Concepts of Geodetic		Methods.....	14
Projections.....	18	7.6 Project 4.....	14
4.2 Mercator Projection.....	7	<b>8. Cartographic Data.....</b>	<b>80</b>
4.3 Gaussian Conformal Mapping –		8.1 General.....	2
Transverse Mercator.....	14	8.2 Topography.....	4
4.4 Universal Transverse Mercator		8.3 Hydrography.....	4
System (UTM).....	7	8.4 Navigational Aids and Navigational	
4.5 Conformal Lambert Projection.....	7	Systems.....	3
4.6 Universal Polar Stereographic		8.5 Sailing Directions and Other Textual	
Projection.....	7	Information.....	3
4.7 Project 2.....	10	8.6 Tides – Vertical Datums.....	4

**ANNEXE 2 A LA LC DU BHI 89/2004**  
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<b>Subject Area</b>	<b>Hours</b>	<b>Subject Area</b>	<b>Hours</b>
8.7 Photogrammetry and Aerial Photography.....	9	11.6 Data Acquisition Processing.....	10
8.8 Satellite Imagery.....	9	11.7 Products.....	3
8.9 Oceanographic Data.....	4	11.8 Quality Control.....	9
8.10 Marine Geology and Magnetic Data.....	3	11.9 Cartographic Symbols Design.....	8
8.11 Data Evaluation.....	6	11.10 Digital Elevation Models.....	28
8.12 Data Preparation.....	6	11.11 Spatial Databases.....	10
8.13 Data Assimilation.....	6	11.12 Project 8.....	105
8.14 Quality Control.....	3	<b>12. Data Bases.....</b>	<b>24</b>
8.15 Project 5.....	14	12.1 Data Base General Concepts.....	3
<b>9. Field Data.....</b>	<b>70</b>	12.2 Data Base Management System..	7
9.1 Preparation of Survey.....	7	12.3 Relational Data Model.....	7
9.2 Execution of Survey.....	24	12.4 Object Oriented Data Base.....	7
9.3 Data Processing.....	7	<b>13. ENC Production.....</b>	<b>158</b>
9.4 Project 6.....	32	13.1 Theoretical Overview.....	25
<b>10. Traditional Cartography.....</b>	<b>112</b>	13.2 Procedures, Methods and Tools....	79
10.1 Compilation.....	18	13.3 Project 9.....	54
10.2 Drafting.....	3	<b>14. Geographic Information System..</b>	<b>35</b>
10.3 Printing.....	7	14.1 Introduction to GIS.....	4
10.4 Quality Control.....	7	14.2 Geographic Information.....	4
10.5 Cartographic Maintenance.....	7	14.3 Data Input.....	4
10.6 Project 7.....	70	14.4 Data Output.....	4
<b>11. Computer Assisted Cartography.....</b>	<b>206</b>	14.5 Data Storage and Management.....	5
11.1 Types of Digital Data: Raster, Vector.....	4	14.6 GIS Implementation.....	7
11.2 Digital Cartographic Systems.....	4	14.7 GIS Applications.....	7
11.3 Data Capture Methods.....	10	<b>15. Legal Administrative aspects.....</b>	<b>42</b>
11.4 Modelling Geographic Data in the Computer.....	10	15.1 Product Liability.....	7
11.5 Data Conversion Procedures.....	5	15.2 Copyright and Contracts.....	7
		15.3 Law of the sea.....	7
		15.4 Delimitation Zones.....	14
		15.5 Project 10.....	7

## PROJECTS

The projects to be completed at the end of each module are the following:

**Project 0:** The Project is based on a step-by-step development of simple applications in Delphi, by the students.

**Project 1:** Carry out spheroid transformation for a charted area, in order to determine the (plotted) x,y,z shifts at various chart scale coverages.

**Project 2:** Prepare projection calculations and overlapping compilation plots for each of the following projections: Mercator, Lambert, Gnomonic and Gauss.

**Project 3:** Plan a voyage, emphasising the types of navigation and the characteristics of the cartographic documents used or necessary

**Project 4:** Study and detail a specification of a chart scheme including the preparation of a development plan and the cost/effort evaluation.

**Project 5:** Collect, evaluate and prepare all source data for the area specified in the chart specification prepared in Project 4.

**Project 6:** Carry out a field survey, to collect miscellaneous data/information for the specified area.

**Project 7:** Prepare a chart compilation in accordance with the INT chart specification the projection plot prepared in Project 2 and the source data gathered in Projects 5 and 6.

**Project 8:** Using the chart specified in Project 4 and the data collected in project 5 and 6, digitise all relevant source data and then prepare a digital compilation of the same chart prepared in Project 7. Digital colour separation plates are to be prepared on completion of the compilation.

**Project 9:** Using geometric primitives from the digital data prepared in Project 7, prepare an ENC cell based on the S 57 standard (including all phases up to validation).

**Project 10:** Prepare lines of delimitation between opposite and contiguous states.

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## LOGISTICS

**Accommodation:** Twin-bedded rooms (two students per room) for the entire period of the course.

**Food arrangements:** Breakfast, lunch and dinner will be provided by IMA.

Accident insurance will be provided by IMA.

**Pocket money and other personal expenses will be at the charge of the organization to which the student belongs.**

Assistance in obtaining a visa may be provided by IMA, but should be the responsibility of the National Organization.

Prepaid air tickets will be made available at a selected air company (will be communicated by IMA) in the country.

**Note: The air ticket will have to be refunded in case of non-completion of the course.**

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**COURSE ON NAUTICAL CARTOGRAPHY**  
From 13 April to 7 December 2005

**NOMINATION FORM FOR PARTICIPATION**

A completed nomination form should be submitted to the Director of the International Maritime Academy\*, Trieste, Italy **THROUGH THE ITALIAN EMBASSY\*\***, with a copy to the IHB Monaco\*\*\*. Nominations should be made as early as possible, using a separate form for each nomination, indicating clearly the Government's priority if more than one participant is nominated:

1. FAMILY NAME .....
- FIRST NAME.....
- OTHER NAME .....
- TITLE.....
2. Mailing address.....
- .....
- .....
- Telephone (including country and local code).....
- Fax .....
- E-Mail.....
3. Nearest airport where air travel will commence and terminate:  
Name of airport.....
- Location.....
4. Date of birth.....
5. Sex:    Male            Female.....
6. Place of birth.....
7. Nationality .....
8. Passport No.....
9. Date and Place of Issue.....
10. Person to notify in case of emergency:  
Name .....

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\* International Maritime Academy, via Eduardo Weiss 15, 34127 Trieste, Italy. (Fax: +39 040 350322.e-mail: <imoima@imoima.org>).  
\*\* **The nominations not transmitted to the Italian Embassy will not be accepted and taken into consideration.**  
\*\*\* International Hydrographic Bureau, BP445, MC 98011 MONACO CEDEX, Principality of Monaco.(Fax: +377 93 10 81 40; e-mail: <info@ihb.mc>).

**ANNEXE 3 à la LC du BHI 89/2004**  
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Address.....

.....

Telephone.....

Fax.....

E-Mail.....

11. Present position and description of duties.....

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12. Organisation.....

13. Education (please attach Curriculum Vitae).....

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14. Relevant professional experience.....

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15. English Language/Competence.....

16. Computer skills.....

Nominee's signature.....

**The above-mentioned person is nominated as our first/second possible participant in the course**

Name and signature of Government official authenticating this nomination.....

Title.....

**ACCEPTANCE FORM**

I hereby accept the invitation of the International Maritime Academy (IMA) to participate in the Course on Nautical Cartography (from 13.4. – 7.12.2005).

I confirm that:

1. I will refrain from engaging in political, commercial and any activities other than those governed by the course programme;
2. I will advise the Academy immediately if I am unable to attend the course; and
3. I will travel to Trieste, Italy and return to my home country at the end of the course, as appropriate, by the route designated by the Academy.

Signature of Participant.....

Name of Participant .....  
(Printed)

Address .....  
.....  
.....

Date.....

\_\_\_\_\_