Accompanying document to S-5A, S-8A, S-5B and S-8B

International Federation of Surveyors

International Hydrographic Organization

International Cartographic Association

Guidelines for the Implementation of the Standards of Competence for Hydrographic Surveyors and Nautical Cartographers

Edition 4.0.0 – August 2026

Comments arising from the experience gained in the application of the guidance are welcome. They should be addressed to the Chair of the International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers at the below address. This document is published periodically. Please check with IHO for the latest edition, including current amendments.

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INTERNATIONAL FEDERATION OF SURVEYORS

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

INTERNATIONAL CARTOGRAPHIC ASSOCIATION

GUIDELINES FOR THE IMPLEMENTATION OF THE FIG-IHO-ICA STANDARDS OF COMPETENCE FOR HYDROGRAPHIC SURVEYORS AND NAUTICAL CARTOGRAPHERS

Edition 4.0.0 – August 2026

Guidance for Professional, Educational and Training Programmes

These guidelines are to be used for the preparation of submissions of individual recognition schemes and for programmes in hydrographic surveying or nautical charting against the FIG-IHO-ICA Publications S-5A/B and S-8A/B Standards of Competence for Hydrographic Surveyors and Nautical Cartographers. Submission documents must comply with the Guidelines to allow for the review process by the Board.

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ABSTRACT

All components of the hydrographic surveying and nautical cartography professions face challenges as how best to ensure the continuance of high standards and how best to ensure the continuation of best practices world-wide based on minimum standards of competence. In order to achieve these objectives, three international organizations (FIG, IHO and ICA) have developed Standards of Competence that institutions or professional bodies may adopt for their educational/training programmes and competency schemes.

Standards indicate the minimum degree of knowledge considered necessary for hydrographic surveyors and nautical cartographers to meet national and international hydrographic and charting requirements and the diverse needs of industry.

The standards developed are known as S-5 describing the competencies for hydrographic surveyors and S-8 describing the competencies for nautical cartographers.

Both Standards recognize two levels of programme. Category "A" programmes introduce content and learning outcomes primarily from the underlying principles level. Category "B" programmes introduce them primarily from a practical level.

The intention is that a Category "A" qualified individual, with appropriate experience, would be a senior professional in their chosen area of activity (government, industry, academia). Category "B" qualified individuals, with appropriate experience, would be technical professionals preparing and delivering products and services to meet specifications and outcomes.

Revision history

Date	Edition	Description and changes
August 2026	4.0.0	● Aligned Guidelines with Edition 2.0.0 of the S-5A, S-5B, S-8A and S-8B Standards ● Renamed teaching activity categories: "Theory (T)" changed to "Lectures (L)" and "Practical (P)" changed to "Practicals (Pr)" ● Added formal definitions of Lectures, Tutorials, Practicals and Self-Guided activities ● Renamed Category "B" cartographic final project from CCP to CFCP (Comprehensive Final Cartographic Project) ● Renamed Category "A" cartographic final project from CFCP to CMCP (Complex Multi-disciplinary Cartographic Project) ● Introduced explicit reference to Geospatial Data Analysis/Analytics in practical exercises, final projects and certificate wording (sections 4.1, 4.2, 6.3.2, 8.3) ● Restructured Exemptions (Section 2.4) into three distinct sub-sections: no exemptions permitted (2.4.1), programme-level exemptions (2.4.2), and individual student exemptions (2.4.3) ● Differentiated minimum programme duration by Standard: Category "B" 24 weeks (S-5) / 25 weeks (S-8); Category "A" 40 weeks (S-5) / 42 weeks (S-8) (Section 3.2) ● Limited S-5 Subject course recognition to exactly one complete Subject per submission (previously "1 or more") ● Added requirement to describe language competency assessment for non-native speaking students (Chapter 1) and instructor language competency evidence (Chapter 2, Staff List) ● Permitted explicit use of simulators for practical exercises, subject to existing requirements (Section 4.3.1) ● Clarified "COULD BE RECOGNIZED" outcome to allow the Board to request a complete revised version of the submission with changes highlighted (Section 8.2) ● Merged and clarified the Cross-Reference Table guidance and examples (Chapter 7); excluded hours for content not aligned with the Standards
April 2025	3.0.0	● Updated to include the recognition of S-5 (A and B) Subjects ● Increase the number of delegates of the Institutions that can attend the respective questions and answers sessions on the IBSC meetings to 3 persons (Section 8.2) ● Changed the process to inform the submitting Institution on the results by a formal letter after the IBSC meeting (Section 8.2) ● Cancelled the reference to not being allowed to use the IBSC, FIG, IHO and ICA logos on the certificates (section 8.3)
August 2023	2.1.4	● Updated Numbering of Annexes ● Additional emphasis on direct supervision of Final Project by institutions 4.2, 4.3.2 and Section 7 and on the afloat time in 4.3.1 ● Additional wording on compliance with submission format and removal of paragraph numbers from Section 7 for clarity ● Additional emphasis on the PDF digital submission Section 7 ● Additional column on the Information About Each Module in the Programme (Section 7) to include for each Activity the Tutorial hours
June 2022	2.1.3	● Improved text in items 3.2.3, 4.1, 4.3.1, 4.3.2, 6 and 6.2.8 ● New item 6.2.17 with six points ● Section 8.2 the possible Board's decisions were modified

July 2021	2.1.2	● Improved text in items 3.2, 4.1, 4.3.1, 7., 7.2.2, 7.3.2, 7.6 and 7.6.1 ● New item 3.2.3 ● Section 4.3 divided internally in two sections 4.3.1 and 4.3.2
March 2020	2.1.1	● New item 2.7 ● Improved text in items 4.1, 4.2 and 4.3 ● Improved text and examples in item 7.1 ● Amended item 8.2 ● Amended checklist and diagrams in the Annex
May 2019	2.1.0	● General editing and formatting ● Section 6. Professional Certification or Recognition Schemes clarified ● Section 7.1 a single PDF digital submission only ● Section 7.1.3. Inserted an example of a Module Schedule Table ● Section 7.1.3 Requirement for a Timeline of the programme ● Section 7.1.5. Inserted an example of the Practical Exercises Table ● Section 8.1 & 8.2. Clarified IBSC review and Evaluation Process ● Section 9.3 & 9.4. Requirements for Annual Report modified ● Annex A. Checklist and flow diagrams modified
March 2017	2.0.0	● Covers both S-5 and S-8
July 2016	1.1.0	● General editing and formatting ● Section 3.2 on time frames modified ● Modification of section 8.2. Define eligible submission, split review process between individual evaluation and IBSC review process. ● Inserted checklist and flow diagrams to Annex A
January 2016	1.0.0	First edition

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ABBREVIATIONS AND ACRONYMS

B	Basic subjects
C	Cartographic science subjects
CFCP	Comprehensive Final Cartographic Project
CMCP	Complex Multi-disciplinary Cartographic Project
CFFP	Comprehensive Final Field Project
CMFP	Complex Multi-disciplinary Field Project
CPD	Continuing Professional Development/Education
CV	Curriculum Vitae
E	Essential subjects
F	Foundation science subjects
FIG	International Federation of Surveyors
H	Hydrographic science subjects
IBSC	International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers
ICA	International Cartographic Association
IHO	International Hydrographic Organization
ILO	Intended Learning Outcome
NFP	National Focal Point
L	Lectures
Tu	Tutorials
Pr	Practicals (fieldwork and/or laboratories)
SG	Self-guided exercises (or student's personal independent work)
WG	Working Group

1. PREFACE

Historical development of the Standards: During the International Congress of Surveyors (FIG) at Wiesbaden in 1971, a Working Group (WG) was formed by Commission IV (Hydrography) to develop International Standards of Competence within the profession of surveying at sea. In 1972, during the International Hydrographic Conference in Monaco, the International Hydrographic Organization (IHO) set up a working group for the compilation of training programmes in Hydrography conducted by Member States. In 1974, at the XIV FIG Congress in Washington, it was resolved that the FIG and IHO working groups combine to study and modify the Report of the FIG working group on Educational Standards.

The Report of the joint FIG-IHO WG was accepted by the two parent bodies at their respective conferences in 1977. In consequence of similar resolutions passed at these conferences an FIG/IHO International Advisory Board on Standards of Competence for Hydrographic Surveyors (the Board) was formed.

The Board met annually and compiled and regularly updated "Standards of Competence for Hydrographic Surveyors" (the Standards). The intention of the Board in preparing these Standards was to provide guidance whereby individual surveyors may be trained and qualified in accordance with internationally accepted levels of competence.

Standards of Competence for Nautical Cartographers: At the IHO Second Extraordinary Conference in March 2000 the development of a set of Standards of Competence for Nautical Cartographers was approved. It was agreed that the Board would be the appropriate body to lead the preparation of these Standards, with the contribution of the International Cartographic Association (ICA).

The Board therefore changed its name to the FIG/IHO/ICA International Advisory Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers. The Board comprises twelve (12) Members representing the three parent organizations: FIG (4); IHO (4); and ICA (4). The Secretariat is provided by the IHO Secretariat. In 2009 the name of the Board was changed to *FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers* (IBSC).

Standards Development: The Standards are known as S-5 describing the competencies for hydrographic surveyors and S-8 describing the competencies for nautical cartographers. They indicate the minimum degree of knowledge and experience considered necessary for hydrographic surveyors and nautical cartographers, and provide a set of programme outlines against which the Board may evaluate programmes submitted for recognition. In 2008 the recognition period of programmes which had been ten (10) years was reduced to six (6) years, with a transitional period for the existing programmes.

Both Standards recognize two levels of programme: Category "A" and Category "B". In the hydrographic community, Category "A" programmes offer levels of comprehensive and broad-based knowledge in all aspects of the theory and practice of hydrography and nautical cartography. Category "B" programmes provide a level of practical comprehension, along with the essential theoretical background, necessary for individuals to carry out the various hydrographic surveying and nautical cartography tasks.

Earlier editions of the Standards were structured so that Category "B" programmes provided technical education to support a set of fundamental and practical competencies. Initially, Category "A" educational programmes included all Category "B" competencies plus additional detailed-level competencies. This meant that Category "B" was a subset of Category "A".

Since its inception the Board has developed and published twelve (12) editions of the S-5 and four (4) editions of the S-8. These editions reflect the significant scientific and technological developments in the fields of hydrography and cartography, and include considerable improvements in the submission, delivery and review procedures of the programmes. In 2011, a fee was introduced for all submissions.

Separation of Category "A" and Category "B": It became evident to the IBSC that there were influencing factors that brought to the fore a number of imperatives for change in the way hydrographic surveyors and

nautical cartographers are educated. To adapt to these new challenges, methodologies, equipment and software, the Board agreed on the separation of Category "A" and Category "B" requirements and a future separate path of development for each category. The motivation behind the separation of the Category "A" and Category "B" requirements and the intended outcome of Category "A" and Category "B" education/training is as follows:

A Category "A" programme will introduce subjects from the beginning at the underlying principles level. A Category "B" programme will introduce subjects from a practical level. According to the above framework the Category "B" Standard is aimed at the *basic educational and training* requirements for hydrographic technicians and hydrographic surveyors (S-5), and nautical cartographers (S-8). The Category "A" Standard is aimed at the *theoretical educational and foundational background* necessary for hydrographic surveyors/nautical cartographers in-charge and hydrographic/cartographic managers who will develop specifications for surveys and charts, establish quality control and quality assurance systems, and respond to the specific requirements of a full range of hydrographic and/or cartographic projects.

For both Category "A" and Category "B" Standards, the ability to conduct or operate hydrographic surveys in the field or utilize hydrographic and/or cartographic databases to compile and produce charts are essential competencies, and thus a key part of education and training through the necessity of field and applied work (practical exercises and final project).

The educational process itself is in turn influenced by changing technological and methodological imperatives. Connectivity and the introduction of so-called e-learning methods and blended learning techniques have naturally attracted the attention of the professional community. Another relevant issue is the educational approach in the development of the standards relating to the principles of the style in which the requirements are presented. The IBSC adopted the concept and principles of *constructive alignment* that are used in most academic institutions and are documented in educational texts, for example Biggs and Tang, Teaching for Quality Learning at University, Open University Press (3rd Edition, 2007). The Standards describe *Intended Learning Outcomes* (ILO's) using verbs that are detailed under Bloom's taxonomy. In principle, an institution will evaluate students to ensure that they have achieved each learning outcome.

The separation of Category "A" and Category "B" Standards in addition to the adoption of constructive alignment approach was approved in 2012.

Options have been removed from the Standards. The philosophy of the Standards is to develop a hydrographer or nautical cartographer who can work with competence across the full spectrum of the profession. Therefore, the core content within the previous options is considered necessary for all hydrographers and nautical cartographers and can no longer be considered optional. In defining competencies in terms of ILO's, the opportunity exists for institutions to focus attention on specific issues while adhering to competencies and associated content as described in the Standards. Thus, while core competencies are retained, institutions can offer unique programmes within this framework, directed towards specific needs.

In 2026, following two years of consultation with industry and educational institutions Edition 2 of each of the S-5A, S-5B, S-8A and S8-B standards was released to account for the changes in technology, process and systems that had evolved since the previous edition.

Guidance: In support of the Standards and in particular, to support submitting organizations, Guidelines have been developed that are maintained in parallel with the Standards. These Guidelines, including tables and templates, available on the IHO website, are to be used alongside the Standards, by a submitting organization. The Guidelines are designed to ensure that the various sections and requirements of submission adequately demonstrate the required evidence and documentation for the Standards.

With Edition 3, the guidelines provided for the recognition by the IBSC of S-5 Subject-level courses. Recognition may only be granted for training or education offerings comprising one (1) complete *Subject* as defined in S-5A and S-5B, section 2.1. Recognition may be granted only for Essential (S-5B) or Foundation Science or Hydrographic Science (S-5A) Subject-level course offerings.

Edition 4 of the Guidelines was released in 2026 to align with the changes introduced in Edition 2 of the

standards.

To further aid and support the process, a series of commonly encountered questions have been listed in the FAQs also available alongside the Standards on the IHO website.

Synopsis: All components of the hydrographic surveying and nautical cartography professions face challenges as to how best to ensure the continuance of the high standards and how best to ensure the continuation of world-wide best practices based on minimum standards of competence. The IBSC believes that the present editions of the Standards will serve the purpose and will deliver authoritative guidance to the pertinent institutions around the world to prepare, submit and deliver programmes that will be to the benefit of the international hydrographic community.

2. DEFINITIONS AND TERMINOLOGY

For purposes of recognition, a *programme* is a complete schedule of study, practical exercises and final project that leads to graduation, including all learning outcomes and content defined in the standards. A *subject* is a full *subject* as described in the Standards. For purposes of delivery and assessment, a programme will typically be broken down into modules. The term *module* will be used hereafter to describe a delivery component.

2.1 Categories of Programmes, Subjects and Schemes

Categories of programmes, subjects, and schemes for hydrographic and cartographic personnel are defined with respect to the theoretical background and working knowledge of those who successfully graduate from such programmes. The following programmes, subjects and schemes are eligible for international recognition by the FIG/IHO/ICA IBSC:

2.1.1 **Category "A" Programmes and Subjects:**

A programme that provides a comprehensive and broad-based knowledge in all aspects of the theory and practice of hydrography, nautical cartography and allied disciplines for individuals who will practice analytical reasoning, decision-making and development of solutions to non-routine problems. A subject course is a discrete formal training proposal at the same level, limited to coverage of only one of the foundational science or hydrographic science subjects as described in S-5A, Subject recognition is not available for S-8A.

2.1.2 **Category "B" Programmes and Subjects:**

A programme that provides a practical comprehension of hydrographic surveying and nautical cartography for individuals with the skill to carry out the various hydrographic surveying and cartography tasks. A subject course is a discrete formal training proposal at the same level, limited to coverage of only one of the Essential subjects as described in S-5B, Subject recognition is not available for S-8B.

2.1.3 **Schemes for Professional Certification:**

A regional or national Scheme for the review, assessment and professional certification of an individual to ensure that they possess the relevant and up to date competencies to perform the role of a hydrographic surveyor or nautical cartographer at the appropriate level. The term “Scheme” will be used to differentiate professional certification from educational programmes.

2.2 Recognition of Programmes, Subjects and Schemes

2.2.1 **Recognition:**

The Board may grant recognition for *programmes (and subjects for S-5A/B)* meeting the S-5A/B or S-8A/B Standards of Competence. The Board may also grant recognition for *schemes,* that follow the guidelines described hereafter, and referring in their review assessment process to the S-5A/B and/or S-8A/B Standards of Competence.

2.2.2 **Period of Recognition:**

Programme, Subject, or Scheme recognition remains valid for six (6) years, after which a new submission is required. The Board does not grant retrospective recognition to any Programme, Subject, or Scheme.

2.2.3 **Recognition of Individuals:**

The Board does not grant recognition to individuals.

2.2.4 **Professional certification:**

The Board may grant recognition to National or Regional Schemes for professional/competency certification of individuals.

2.3 Classes of Subjects

2.3.1 ***Basic* Subjects**

These are the subjects underlying all aspects of hydrographic surveying and nautical cartography. They contain the knowledge necessary for understanding the general principles of hydrography and cartography, including mathematics, statistics, information communication technologies, physics, earth sciences, nautical science and meteorology, as applicable.

2.3.2 ***Essential* Subjects for S-5B and S-8B**

These subjects are considered essential for all hydrographic surveyors and nautical cartographers and together with the basic subjects, form the core of the academic syllabus within the S-5B and S-8B Standards.

2.3.3 ***Foundation Science* Subjects for S-5A and S-8A**

These subjects provide a detailed knowledge of the underlying principles that support hydrography and nautical cartography. These are common to other science fields such as geomatics or marine science and contribute to the core of hydrography and nautical cartography.

2.3.4 ***Hydrographic Science and Cartography Science* Subjects for S-5A and S-8A**

These subjects are considered essential for all hydrographic surveyors and nautical cartographers respectively at the Category "A" level. When combined with *Foundation Science* knowledge they constitute a comprehensive knowledge of hydrography or nautical cartography.

2.4 Program and Student Exemptions

2.4.1 No exemptions are permitted from Essential (S-5B/S-8B) or Hydrographic Science (S-5A) or Cartography Science (S-8A) subjects. These subjects must be included in the programme.

2.4.2 Exemptions from including *Basic* and/or *Foundation Science* Subjects in Programmes.

Within any submission, the Board will consider cases when an institution intends not to deliver a particular subject/topic/element within the *Basic* or *Foundation Science* subjects when entry requirements for all students completely cover the related content and learning outcomes.

2.4.3 Exemptions for Individual Students

Institutions that deliver *Basic* and *Foundation Science* subjects may exempt individual students from these subjects when the student has already achieved the related content and learning outcomes. The process of evaluating claims for such exemptions must be clearly described in the submission.

2.5 Elective Modules

To be recognized against the Standards, a programme must demonstrate that, independently of the student's choice of elective modules, all the S-5A/B or S-8A/B elements are covered by the common programme/subject syllabus.

2.6 Level of Knowledge

Bloom's taxonomy has been used as the basis to describe each intended learning outcome of the Standards, and the associated verbs are an indication of the expected level of knowledge. One of the three following levels of knowledge is associated with each element of the S-5A/B and S-8A/B.

2.6.1 **Basic** - Basic knowledge of the subject provides familiarity with the concepts. Active verbs (indicating recall, recognition and comprehension of materials) associated with learning outcomes include but are not limited to: define, identify, describe, explain, differentiate, predict.

2.6.2 **Intermediate** - Knowledge of the subject as far as theory and principles are concerned, sufficient to enable their application in practice in all common hydrographic and nautical cartography tasks. Active verbs (indicating application and analysis) associated with learning outcomes include but are not limited to: apply, use, calculate, solve, classify, analyze.

2.6.3 **Advanced** - Thorough knowledge of the subject in all its aspects to enable its application in all hydrographic and nautical cartography activities including the most difficult areas. Active verbs (indicating synthesis and evaluation) associated with learning outcomes include but are not limited to: evaluate, select, design, specify, plan, create.

Category "B" Programmes and Subjects are intended to deliver Basic and Intermediate levels of knowledge, and Category "A" Programmes and Subjects are intended to deliver Basic, Intermediate and Advanced levels of knowledge.

2.7 Constructive Alignment

Constructive alignment is a development in the guidelines for education that is now accepted practice in tertiary education. It is a component of the Bologna Process that standardizes educational practices across Europe. The intention is to deliver material constructively in a way that the learner thinks and to align the assessment accordingly through a set of learning outcomes. The concept of alignment hinges on assessment against the desired outcomes of a course with appropriate verbs used to indicate the expected level of learning. The International Hydrographic Review (IHR-Nov17) published an article of the IBSC addressing this approach (https://iho.int/en/basic-board-documents).

3. TIME FRAMES

3.1 Maximum Duration of Programmes

The time frame over which an individual studies towards a recognized programme cannot be more than five (5) years for a Category "B" Programme and no more than six (6) years for a Category "A" Programme. The time frame for a discrete Subject course cannot exceed one (1) year per Subject.

3.2 Minimum Duration of Programmes

The minimum duration of Programmes must be sufficient to allow students to absorb the knowledge through the lectures, tutorials, self-study, practical exercises and the final project. In the experience of the Board, to achieve the above, for a programme (without exemptions sought) delivered full-time, "face-to-face teaching"

in a continuous manner an expected minimum time frame, excluding any period of holidays and non-syllabus work, is:

3.2.1 At Category "B", twenty four (24) weeks for S-5 programmes and twenty five (25) weeks for S-8 programmes, including the final project.

3.2.2 At Category "A", forty (40) weeks for S-5 programmes and forty two (42) weeks for S-8 programmes, including the final project.

Programmes or Subject courses that include remotely delivered taught modules, via on-line teaching methods where the practical consolidation exercises cannot be provided concurrently with the theoretical learning, are expected to require additional allocated time. This extra allocated time is required, at the time of the practical exercises, to allow for a theoretical refresher of the initially taught materials. Thus, a taught module that would have had several hours of lectures may have to dedicate a significant period of time, once the students are assembled, to re-familiarize them with the theoretical components.

4. PRACTICAL EXERCISES AND FINAL PROJECT

Because hydrography and nautical cartography are applied disciplines, every student undertaking a Category "A" or Category "B" Programme is expected to receive hands-on experience under direct supervision of the instructors. This experience should form an important part of the student's assessment, and should be considered in two parts, practical exercises and a final project. In addition, every hydrographic programme is expected to contain practical exercises and operations that ensure all students experience the unique challenges of operating systems and equipment, and collecting data in a vessel afloat. The supervision of the students should be clearly described including the ratio of supervisors to students.

4.1 Practical Exercises

Both Category "A" and Category "B" Programmes and Subject courses should contain practical hydrographic surveying or nautical charting exercises to consolidate the learning outcomes of the modules. These should include, for example: experiments, exercises, laboratory work, nautical charting, and Geospatial Data Analytics exercises and fieldwork designed to complement the theory component. Each practical exercise should be clearly explained in terms of what the students are expected to do and what outcomes are achieved. This practical consolidation must be completed before the students proceed to their final project.

4.2 Final Project (CFFP, CFCP, CMFP and CMCP)

Any qualifying programme must also include a minimum period of at least four (4) weeks devoted to a supervised comprehensive final project. The final project should occur at the end of the programme after the completion of the lectures and practical exercises, so that knowledge gained in earlier work can be put into practice. These projects should reflect the level of the overall knowledge outlined in the programme, and a full report should be compiled by students. Assessment of intended learning outcomes associated to this project is an important factor and an evaluation scheme for the final project must consider alignment for individual students. The Final Project must be coordinated and directly supervised by the institution.

The *Comprehensive Final Field Project* (CFFP) for a Category "B" hydrographic surveying programme will exercise the skills of the students to carry out the various hydrographic surveying tasks.

The *Comprehensive Final Cartographic Project* (CFCP) for a Category "B" nautical charting programme will exercise the skills of the students to carry out the various nautical charting and basic Geospatial Data Analysis tasks.

For students of a S-5 Category "A" Programme, a *Complex Multi-disciplinary Field Project* (CMFP) is required, which will include analytical reasoning, decision making and development of solutions to non-

routine problems. The instruction for the CMFP must include a complex multi-disciplinary scenario from which the students must develop the survey specifications and plan the survey operation.

For students of a S-8 Category "A" Programme, a *Complex Multi-disciplinary Cartographic Project* (CMCP) is required, which will include analytical reasoning, decision making and development of solutions to non-routine problems. The instruction for the CMCP must include a composite cartographic scenario from which the students must develop the cartographic solution, the process for its implementation and the production of the resulting nautical chart/ENC together with Geospatial Data Analysis problems and their results.

Discrete Single-Subject courses are not expected to include a comprehensive final project, but must include, where appropriate to the subject, material practical exercises and hands-on learning.

4.3 Guidelines for Practical Exercises and the Final Project

4.3.1 Practical Exercises

The (educational) purpose of the practical exercises, for both Category "A" and Category "B", is to consolidate their theoretical knowledge and give every student experience in performing as many hydrographic, nautical charting and geospatial data analysis tasks as possible. For example, levelling, tide gauge installation, shore lining, multi-beam surveying, spatial data acquisition, spatial data evaluation, processing and analysis, composition, generalization, chart production and reproduction, etc.

Practical exercises associated with the educational modules should occur throughout the programme of study and **must be completed prior to commencement of the final project.**

Where, due to the method of course delivery, practical consolidation exercises cannot be provided concurrent with theoretical learning, a period of theoretical refresh of the associated theory will be required at the time the practical exercises are undertaken.

Simulators may be used in certain circumstances, provided that they meet the requirements set out above.

4.3.2 Final Project

The final project is additional to the practical exercises that form a part of the course modules syllabi and is designed to complement the theory component of the programme. The final project serves as a comprehensive, standalone demonstration of all skills learned throughout the program rather than a part of the instructional or teaching modules. The final project should occur at the end of the programme, so that knowledge gained in earlier work can be put into practice. The Final Project must be conducted under the control and supervision of the institution.

The Final Project should be a single cohesive and integrated project and not a series of separate tasks. Final projects must reflect the level of knowledge outlined in the programme syllabus and therefore Category A projects will differ significantly from Category B projects, even if delivered concurrently by the same institution.

Reference material should be available to students, including an archive of case study material, equipment, and costing information to allow students to plan and design the survey/nautical chart.

Consideration should be given to involving experienced hydrographers and nautical cartographers, and, when necessary, equipment provided by external agencies in the final project, to supplement the resources of the training institution.

Ultimately, the final project represents a critical component of the student performance evaluation. Students should prepare a complete final project report and associated hydrographic survey or nautical charting and

geospatial data analysis deliverables. The final project report must form part of the performance assessment for students. Because teamwork is essential to these operations, the final grading structure must ensure that students are evaluated both on their individual competence and on their group participation.

5. FIELD AND OFFICE EXPERIENCE

The Board acknowledges that work experience in the field or office is an essential component of individual competence. The Board encourages the development of professional certification or individual recognition schemes by regional or national authorities such as Hydrographic Offices and/or professional societies and provides a process described in Section 6 below, for the international recognition of these schemes.

6. PROFESSIONAL CERTIFICATION OR INDIVIDUAL RECOGNITION SCHEMES

The Board *does not provide recognition to individuals* directly. It does however seek to recognize formal systems and schemes that review and assess individuals' experience in order to provide them with professional certification or individual recognition of their Competency. These Schemes offer to monitor and assess individuals at regular intervals and to register them in a formal system so that an individual may gain professional certification or individual recognition at a defined level of competency.

The Board anticipates that, as more Schemes are developed, there is a potential for new Schemes to seek Recognition at an early stage. However, if the scheme is not fully operational there will be an additional burden of evidence on such submission. Specifically, evidence of qualification requirements and the selection process of the assessment panel, how the assessments of individuals are made, reviewed and defended or appealed, as well as examples of the documentation that would be generated as an application is considered and handled by the Scheme. The Scheme will be expected to provide evidence that there is a commitment to its ongoing operation and that a sustainable approach to implementing and maintaining the Scheme has been developed.

To support this sustainability it is preferred that a scheme exists under the umbrella of a recognized professional body.

6.1 Background, Board Philosophy and Process Concerning Schemes for Professional Certification of Individual Recognition

6.1.1 In issuing the Guidelines, the IBSC fully recognizes and anticipates dialogue with national bodies seeking such recognition as the guidelines are developed to a level of maturity acceptable internationally. In this sense, the guidelines are issued in this document without prejudice. The IBSC encourages schemes to adopt common requirements and levels of competency based on the IBSC Standards, which will facilitate mutual recognition.

6.1.2 The underpinning philosophy of the work of the Board in recognizing professional certification schemes for individuals is that competence equals knowledge plus experience and must be demonstrated. Thus, upon successful achievement by any individual of a Category "A" or a Category "B" Programme, a competency certification within any Scheme consists of *both* successful completion of a programme of study which addresses the topics within the relevant Standard *and* a satisfactory period of relevant experience during which competence has been demonstrated. In addition, the IBSC notes that hydrographic technology is constantly advancing and that, to maintain competence, an individual must pursue continuing professional training and education to ensure that they maintain currency. Consequently, national organizations and academic institutions may decide to recognize and/or certify individuals in order to monitor competency and currency. The IBSC requires that professional certification of individual competency should be based on completion of:

1. A programme of formal education or training, normally as outlined in sub-section 2.1;
2. Experience, as outlined in section 5;

3. A methodology to demonstrate and document competencies;
4. Continuing professional education and training.

The IBSC will consider recognizing schemes that, in addition to a pathway including completion of a Category “A” or Category “B” programme, contain alternative pathways to certification, provided the above conditions are met.

6.1.3 Submissions to the Board must be written in the English language and as a minimum must demonstrate the ability to monitor and assess individuals at the Category "A" and/or Category "B" specified competency level.

6.1.4 The Board shall approve the final wording on the Certificate awarded by the Scheme to individuals.

6.1.5 The Board declares that in publishing these Guidelines it is not its intention to override or challenge any legal or procedural processes imposed upon the Scheme by government or law.

6.1.6 The Board shall expect the following elements in a national or regional Scheme submitted for recognition.

6.2 Guidelines for National and Regional Schemes Submitted for Recognition

6.2.1 The Board shall normally recognize only one Scheme per country or identifiable region for the Standards and thus, a submission must clearly describe its authority and geographic area. It may include endorsements from the appropriate NFP of the Scheme submitted. It may also include, where appropriate, the endorsement of academic institutions, government bodies and professional associations. The Board shall not arbitrate between Schemes within one jurisdiction.

6.2.2 An individual certified by the submitting Scheme as having met the levels of Category "A" or "B" must have completed a recognized Category "A" or "B" Programme. It is required that the submitted Scheme shall describe in detail how the professional certification or individual recognition process functions. Where prior learning and experience are considered within a Scheme the processes undertaken by the accrediting body must be fully described and justified.

6.2.3 The Board shall expect adherence to its currently issued Standard(s) and shall expect that a Scheme will take into account the currency (or validity) of an individual’s experience. Currency will be clearer if the individual has recently satisfied a programme recognized by the Board and has also satisfied the experience minima. Where the certification or process includes vocational training, a full detailed description is required by the Board.

6.2.4 The Scheme should clearly articulate processes and sub-Schemes of Continuing Professional Development/Education (CPD) and show where and how these build relevant units for professional certification or individual recognition. Clear reference shall be made to the current content of the Standards to enable the Board to assess that the processes of CPD adopted provide relevant currency between Editions of the Standards for those individuals who originally certified or accredited against earlier Editions of the Standards.

6.2.5 The process whereby an individual can enter the Scheme should be described in detail. Processes for application should be detailed, including all examples of documentation used. The Board considers that a Scheme should include a degree of examination for entry which might include all or some of the following: interview, oral or written examination with recording of the process being retained to ensure objectivity. Examples of the process using an individual’s work and the records of the reviewers are to be submitted as part of the application process.

6.2.6 It is essential that an individual has recourse to an independent process of appeal to any decision taken by the Panel which administers the entry process into a Scheme. This process of appeal will not be to the IBSC. Appeals must be resolved satisfactorily at the national or regional level in accordance with standards of due process and objectivity. The Board’s interest is in assessing the efficiency of such a process. Thus, the Board

will expect the submitting Scheme to fully describe its adopted appeals process.

6.2.7 The Board shall expect to be able to assess from the documentation provided by a Scheme that peer certification forms part of its system supervision. It follows that a Scheme shall be administered by an assessment panel comprising of members who represent the wider hydrographic surveying and nautical cartography communities including, but not necessarily limited to, members representing its constituent organizations (government, professional, academic, National Focal Point as well as Offshore Industry and Ports where appropriate). The arrangement for assembling the assessment panel, such as: qualification criteria, method of appointment/election, terms of office, will be considered by the Board.

6.2.8 The processes of the Scheme shall include clear record-keeping that details all processes adopted: the complete procedure for assessment of individuals, records of decision, timing, appeals, reasoning, forms and register, follow up processes for assessing currency (validity) etc. These should be comprehensively detailed in the submission.

6.2.9 The Scheme should advise the Board if there are other Schemes within its area of jurisdiction (or elsewhere if there is mutual recognition) and detail how its own status has been defined and agreed regarding those Schemes. It should also detail its communication processes with such Schemes with particular detail on the method it adopts to communicate and share its findings, and how any differences or ambiguities are resolved. In particular, it should describe how it deals with individuals making multiple applications, and whether there is a degree of harmonization, standardization of processes and reciprocity.

6.2.10 The Scheme should publish its Rules and Processes together with its critical dates. This shall be kept current and may be achieved by way of a website. Currency will ensure publication of relevant Rules and Processes before critical dates on which they impact.

6.2.11 A Scheme can operate in the national language but see 6.1.3 above for the Board's language requirement for documentation.

6.2.12 The Board reserves the right to inspect specific Scheme documents, such as the Register of Individuals, where it feels this is necessary to aid it in its own recognition assessment process.

6.2.13 A Scheme might, within its own processes, distinguish between different levels of competency. Where these exist, they should be fully described; the Board will look for detailed cross-referencing to the IBSC Standards, and an explanation as to how such processes contribute to the overall system and ongoing recognition of an individual's competence.

6.2.14 A Scheme might include an overall set of competencies as well as subsets based on topics such as port surveying, bathymetry, shore-lining, etc. Where these exist, they should be fully described, and the Board will look for detailed cross-referencing to the Standards and an explanation as to how such processes contribute to the overall system of professional certification or individual recognition.

6.2.15 Where a submission considers it cannot meet the Guidelines of the Board due to government-imposed procedures or legal requirements, the Board will expect a fully detailed explanation sufficient for the Board to take them into account during its deliberations.

6.2.16 The Board shall look to the comprehensiveness of submitted Schemes and completeness of documentation including, where relevant, documents which authenticate claims made in the submission and reserves the right to seek any clarifying documentation or explanation it needs to assist in its process of review.

6.2.17 Before recognizing a Scheme, the Board will need to be satisfied that:

1. The Scheme, where possible, is supported by the national hydrographic focal points of the country/region that the Scheme covers. This support may be from key government and industry groups.

2. The Scheme documents are openly available, including: the vision of the overall Scheme; description

of an individual application process: an application kit; the general Scheme benefits for individuals and employees; FAQs; key timings and dates; description of the required ongoing commitment of an Individual. These should be available via an online portal or dedicated web site that is maintained and provides access.

3. The process of assessment is described and documented, to show it is thorough, consistent, and represents a fair, traceable and repeatable process of assessment. Examples of possible applications and assessments will support this requirement for evidence.

4. The administration of the Scheme including arrangements for management retention and security of records is described and explained in order to demonstrate that the Scheme is being implemented in a sustainable and robust manner, especially in terms of any changes in personnel or infrastructure and that it has secure processes for data records and documentation.

5. The Scheme is ready for operation and sustainable. Any submission must provide suitable evidence that it has a suitable management team and operations group to administer and maintain the Scheme. The Board would not wish to Recognize a Scheme that did not operate and maintain currency of its members.

6. Access to the Scheme is open and not restricted to certain classes of persons or particular members of an organization.

6.3 Statement to be Included in the Scheme's Certificate

6.3.1 Schemes providing a professional certification or individual recognition process, which has been recognized as outlined in sub-section 6.2, shall be required to issue successful candidates with a certificate of the successful assessment of their professional competencies. Such a certificate may acknowledge that the Scheme has received the Board's recognition, specifying the level of that recognition. The certificate issued by the Scheme shall include text similar to the following example:

"This Assessment Scheme has been recognized as meeting the requirements for professional certification or individual recognition in the FIG-IHO-ICA Standards of Competence for Hydrographic Surveyors or Nautical Cartographers".

6.3.2 The submitted Scheme should include examples of its certificates for all levels awarded by the Scheme. There must be clear, unambiguous discrimination between the certificates awarded for pathways that include completion of Category "A" or "B" programmes and those that do not. An example of the type of text used by a Scheme on its certificate to an individual who has completed an IBSC recognized programme follows:

"Having completed a Category "A"("B") programme recognized by the IBSC against the S-5A/B or S-8A/B Edition NN.N.N of the Standards of Competence for Category "A/B" Hydrographic Surveyors or Nautical Cartographers and Geospatial Data Analysts and, having been successfully assessed by the Scheme recognized by the IBSC, the
… institution …… grants …(name)……...the Hydrographic Surveyor or Nautical Cartographer and Geospatial Data Analyst Category "A"("B") certificate of professional recognition"

6.3.3 **Documentation and Submission.** The procedure for recognition of schemes will generally follow that described for programmes at section 7 below. The documentation required for schemes will vary depending on the scope of each scheme but as a minimum must comply with the requirements of Section 6 and include other relevant general information such as that described in Sections 7.1.1 items 1 and 2.

7. STRUCTURE AND CONTENT OF DOCUMENTATION TO BE SUBMITTED FOR RECOGNITION OF PROGRAMMES AND SINGLE-SUBJECT COURSES

Submission documents must comply with the Guidelines to allow for the review process by the Board. See Annex A: **S-5A/B and S-8A/B** Checklist for Submitting Institutions. The checklist will assist the submitting institution in ensuring all documentation is included.

It is the experience of the Board that a well-prepared submission is one of clarity with detailed cross-referencing of the submitted programme or subject syllabus to the content and learning outcomes provided in the standards. The entire content of a submission MUST be written in the English language.

See Annexes for process diagrams. Giving an overview of both the timeline for submission and recognition process of the Board, the following flow diagrams have also been included in the Annexes:

- Annex B: Application Process Flow Diagram
- Annex C: Procedure for Recognition of Programmes Flow Diagram

The aim and scope of the programme/subject should be clearly stated and the programme/subject structure defined in this context.

While the IBSC appreciates that many submitting organizations do not use English as a first language and many do not teach using English, it is nevertheless essential that submitting organizations strive to make the submitted English language documentation as clear as possible.

Submitting organizations must submit a digital submission only. It should be a single searchable PDF (Portable Document Format) document file that allows the ability to highlight text and allow content copying and commenting. It should be digitally indexed with hypertext links that are clearly and accurately numbered and cross-referenced.

It is important that the submission is comprehensive and adequately documented to reflect the purpose of the programme/subject and is not simply a copy of the programme/subject texts from the Standards.

In summary, the preferred submissions to review are those that are clear, completely cross-related to the Standards, include relevant photographs, and are submitted with explanations of any deviations. The Board recognizes that modern pedagogical theory and practice supports a variety of blended innovations in teaching techniques. The Board will expect that a submission should demonstrate how the required learning outcomes are achieved by the teaching methods and assessment strategy.

Submitting institutions may consider contacting the National Focal Point (NFP) where appropriate. The NFP in a country will normally be the National Hydrographic Authority, in liaison with the national association representing the country in FIG or ICA. NFPs may be in a position to provide support to or benefit from a recognized programme. The submission may include a reference from the NFP and/or associations representing FIG or ICA.

THE FOLLOWING CHAPTER SEQUENCE AND FORMAT MUST BE USED IN ALL SUBMISSIONS:

CHAPTER 1: General Information on the Programme.

Chapter 1 of the submission for either a programme or a single-subject course must include the following sections:

Programme (or Subject) Identification

Name of the Programme or Subject Course
Institution submitting the Programme or Subject course for recognition
Previous recognition year (if any)
Standard and Edition against which recognition is sought
Level of recognition sought (Category "A" or Category "B")
Duration of the Programme or Subject course relevant to the Standards in weeks
Total study hours and the breakdown for **L**ectures**, Tu**torials**, Pr**acticals, and **S**elf-**G**uided (excluding the final project hours)
Duration of the final project (CFFP, CFCP, CMFP or CMCP) in weeks (N/A for single Subject courses)
Country of submitting institution
Language(s) in which the Programme or Subject course is delivered
Programme or Subject course coordinator name and full contact details
Submitting institution primary full contact details for IBSC correspondence
Programme capacity (expected/actual number of students taking the programme each year. For multi-year programmes, the expected total number of students progressing through the programme)
Geographical position of the institution (latitude/longitude)

Aims of the Programme (or Subject)

The submission should, in this section, provide a clear narrative outline of the programme or subject course, with details of the target audience and intended outcome and where it fits within the institution and national/international hydrographic/cartographic community. The section should describe the academic elements of the programme or subject course, and the objectives set for each student and their general learning outcomes.

[Comment: The Board is interested in the underlying rationale for the programme or subject course to the extent this assists its review process. It is necessary for the Board to know as much of the background detail as necessary to comprehend why the programme or course is designed the way it is, especially if there is some specific or even unique local learning outcome required.]

Entry Requirements and Exemptions

Identify normal qualifications required and alternative qualification routes that may be acceptable for students to enter the programme.

If a programme is open to non-native speaking students or is offered in a non-native language, then the submission must provide details of how the language skills of potential students are assessed to be sufficient for the student to successfully undertake the programme. The inclusion of standard international language competency tests is strongly recommended.

Exemptions from Including Basic and/or Foundation Science Subjects in Programmes

Submitting organizations may decide not to include some or all the Basic or Foundation science subjects in their programmes. In this circumstance, the submission must provide a detailed description of the entry requirements for students that shows how they ensure that all students have the knowledge of the exempted Basic or Foundation Science subjects before they enter the programme. ***No exemptions are permitted for Essential, Hydrographic and Cartographic Science subjects***

Exemptions for Individual Students

Submitting organizations that do teach Basic and Foundation Science subjects may exempt individual students from Basic and/or Foundation Science subjects. The process of evaluating claims for such exemptions must be clearly described in the submission.

No exemptions are permitted for Essential, Hydrographic or Cartographic Science subjects.

[Comment:The Board will examine in detail the entry processes of the submitting organization. It will be focused on ensuring the entry requirements are properly and adequately met. Where an entry examination or test is employed, the Board requires an outline of how the examination or test addresses the entry standards required.]

CHAPTER 2: Information About the Programme (or Subject) Infrastructure

Chapter 2 of the submission for either a programme or a single subject course must include the following sections:

Staff List:

For each instructor contributing to the programme or subject course, provide a Curriculum Vitae (CV), which will include:

- Module or parts of the modules taught;
- Academic qualifications, education and training with the respective subjects and dates;
- Hydrographic or cartographic experience with the respective dates;
- Recent publications; and
- Evidence of competency in the delivery language (if not the native language).

[Comment: The Board will look closely at staff CVs, in particular at the specific experience brought to teaching of the programme.]

Facilities Available to Students:

- Equipment: Provide a list of relevant equipment/systems that will be used in the delivery of practical work and in the final project;
- Software: List specific software (with emphasis on hydrographic and cartographic software); The list should note any software dedicated to a vessel, situated offsite and those used by a student remotely on their own devices. The software list should include the number of licenses available or describe how students are assured of access to the software when needed.
- List of training aids (including any e-learning components and associated platforms for their delivery);
- Laboratories (description);
- Training vessels (description, photographs); The vessels used on the Final Project should be clearly identified.
- Library List:
  - total number of volumes held;
  - approximate number of volumes relevant to Hydrography and Cartography;
  - other media available (e.g. charts, maps, audio-visual resources); and
  - availability and access policies to online digital resources.

CHAPTER 3: Programme (or Subject) Description

Chapter 3 of the submission must include the following sections:

Programme or Subject Course Structure

The Programme or Subject course may involve a series of modules and formal training sessions that must include practicals, tutorials and field experience to reinforce and complement theoretical material. It is

important that the programme or subject course structure is clearly described within the submission and that sufficient details of the components are provided. As a minimum the submission should include:

- Table of programme or subject course modules; Schedule of programme or subject course modules identifying where in the sequence each module is taken by students (programme timetable); and
- The duration (in weeks) of each module
- Timeline of the complete programme or subject course (see 7.1.3 item 4. below)

Information About Each Module in the Programme or Subject Course

This section should be easily understood and contains a full and detailed description of each programme or subject module, including a reference to *elements* of the Standards for each course module item. This enables the institution to describe fully the programme or subject in relation to the Standards and aids greatly in the Board's review. Each module of the programme should be described in more detail than the Standards, with a tabulation of lectures, practical exercises and self-guidance hours devoted to each of the elements of the Standards. This will allow the Board to relate the module and lectures to the cross-reference table (see 7.7) and tabulated programme or subject description.

A schedule should be provided showing all delivered items (lectures, tutorials, assignments/ practicals and self-guided) within the module and relates them to *elements* of the Standards. For clarity the following definitions are provided:

L/Tu/Pr/SG (Lectures/Tutorials /Practical or Labs/Self-guided):

- Lectures: instructor-led delivery primarily intended to introduce or explain theoretical concepts to a group of students;
- Tutorials: instructor-facilitated interactive session intended to reinforce learning through discussion, problem solving, guided application or review of concepts;
- Practicals: supervised hands-on activity conducted in the laboratory, field or equivalent environment to consolidate learning through the application of knowledge and skills;
- Self-Guided: independent student learning undertaken outside scheduled instructor-led sessions, including reading, preparation, assignments, individual study and other autonomous learning activities.

This schedule must include for each delivered item: means of delivery; hours allocated; reference to *elements* of the Standards. For the purpose of these Guidelines, the nominal duration of a teaching hour is 50 minutes. If less, then this must be stated in the submission. Activities in this breakdown should be limited to a single session and should not normally exceed 3 or 4 hours for classroom activities or a single day for field practicals. If the activity is longer than 4 hours for classroom activities or 1 day for field activities, it should be divided into shorter segments. An example of a Module Schedule that might be delivered in an S-5B programme is provided in Table 1 where the teaching scheme shows the first five lectures and associated practical/tutorial work. (Coverage in the example is aligned with a student intake directly from high school with passes in mathematics and physics where no previous knowledge or experience in spatial science exists, hence the extended introduction offering familiarization with relevant fundamentals. Time allocated is indicative of the entry level).

	Geodesy				
Learning Activities	Lectures	Tutorials	Practical		Self-Guided Study
Hours	36	8	20		27
Assessment type	Theory Exams/Tests	Practical Exams/Tests	Written Assignments		Presentations
Hours	2	4	7		
Lead Instructor:	Name		Vessel		SV "Name"

Module Outline:

A first course in geodesy that provides students with foundations in reference frames and surfaces used in surveying. Knowledge and skills acquired in this module are essential in underpinning further module content within the programme. Through the combination of theory and practical work with computer software the module offers an applied approach to the subject. Geodesy concerns the dimensions and shape of the Earth and reference frames used in data collection and computations for position. From geophysical data used to determine the figure of the Earth as a surface, mathematical approximations that are used in surveying are presented and realization of reference systems for practical applications defined. A contrast is drawn between traditional methods employed for control of surveys using terrestrial data and the use of modern satellite methods adopted for real-time mapping applications as well as techniques for precise geodetic control used in national mapping and geodynamics.

Learning Outcomes

1. Identify properties and needs for different surfaces used to represent the Earth for different applications and undertake geodetic computations in relation to such surfaces.
2. Describe the reference frames used in geodesy with appreciating their applications, compare methods for moving positional data between them and perform associated computations.
3. Explain traditional methods used in the establishment and realisation of traditional datums for horizontal and vertical control and reasons why this approach has changed with development of satellite technology.
4. Through the use of international examples, explain how modern horizontal and vertical datums for surveying and mapping at national level are established and realised to accommodate temporal components and perform associated computations.
5. Distinguish between broadcast and precise satellite ephemerides, identifying the parameters involved in each case and perform computations to determine satellite location at a particular time in a standard reference frame and relative to the location of a receiver on the surface of the Earth.

Module Reference Material and Bibliography:

Meyer, T.H. Introduction to Geometrical and Physical Geodesy: Foundations of Geomatics, ESRI Press, March 2018.
Hofman-Wellenhof, B. and Moritz, H. Physical Geodesy. Springer, September 2006.
National Imagery and Mapping Agency, Department of Defense World Geodetic System 1984. Technical Report Technical Report NIMA 8350.2, January 2000.
ICSM ANZLIC Committee on Surveying and Mapping. Geocentric Datum of Australia, Technical manual Version 2.4, December 2014.
IERS. Terrestrial reference systems and frames. IERS Technical Note No. 36.
Dawson, J. and Woods, A. ITRF to GDA94 coordinate transformations, Journal of Applied Geodesy No. 4, 2010
Thomas, C.M., and Featherstone, W.E. Validation of Vincenty's Formulas for the Geodesic Using a New Fourth-Order Extension of Kivioja's Formula. Journal of Surveying Engineering, February 2005.
Amos, M. New Zealand Vertical Datum 2009. New Zealand Surveyor, No. 300, 2010.

Module Activity Breakdown

Activity - Lecture, Practical, Assignment	Contents	L	Tu	Pr	SG	S5B Topic
Lecture 1 Introduction to Geodesy	An overview of the course as a whole to place material covered into context. The development of geodesy from measurements to determine the shape of the Earth from 200 years BC through early geodetic surveys to modern reference frames used with GNSS data.	2.0				E1.2

Tutorial 1	Determine formula and undertake computations using historical data obtained by Eratosthenes, Poseidonius, al-Ma'Mun, Abu Rayan al-Biruni and results from early baseline observations to determine the size of the Earth.		1.0			E1.1
Lecture 2	The Earth as a sphere, defining points in 3D by latitude, longitude and radius, Defining great circles, small circles rhumb lines and azimuth. Spherical trigonometry and its application. Use of solar observations to determine azimuth.	3.0				B1.3, E4.3a
Tutorial 2	Solution of problems using spherical trigonometry		2.0		1.0	B1.3
Assignment 1	The Equatorial Sundial Working in pairs, use 4 rounds of observations to the Sun to determine azimuth of an RO and hence align a sundial to North. Write a report with (i) Introduction; (ii) Principles detailing how the Sun can be used to determine both direction and time to explain corrections required to data for both components and computations required for solutions; (iii) Field booking sheet and computations for azimuth performed in the field; (iv) a discussion on precision of the azimuth using results from 4 rounds and accuracy from corrected time read from the sundial with true local time; and, (v) conclusions.			2.0	5.0	B1.3, E4.3a
Lecture 3	Gravity, Newtons laws. Gravity and potential due to mass and centrifugal force. Gravity measurement and normal gravity (GRS80). Gravity anomalies. Geopotential models (EGM2008)	3.0				B3.2, E4.1a
Practical 1 (computer lab)	Use locally acquired gravity data to produce maps of gravity anomalies and compare with a similar map from EGM2008. Consider results in alignment with geological structures.			2.0	2.0	E4.1a, B4.1
Lecture 4	The Earth as a spheroid. Latitude, longitude, radius of curvature and meridional distance. Lines of sight and geodesic on the spheroid. Computations on the spheroid by Normal Section, Vincenty's formula and Kivioja's algorithm. Deflection of the vertical, geoid/spheroid separation and their relationship.	3.0				E4.1d
Practical 2 (computer lab)	Use of scripts, spreadsheets and on-line resources to perform spheroidal computations and reverse computations on lines of different length. Use software for visualization of lines of sight and the geodesic.			2.0	2.0	E4.1d
Lecture 5	Vertical control. Approximating the geoid from Sea level data. Use of levelling to transfer control and influences of Earth potential. The geopotential number and orthometric heights. Review of alternative heighting methods (Helmert heights and dynamic heights). Determining a reference surface for normal-orthometric heights with benefits and applications in surveying.	3.0				E4.4a E4.1c

Practical test 1 (computer lab)	Computations relation to; (i) Comparing traditional bench mark data with heights obtained from GNSS corrected with global and local geoidal models; (ii) Use of normal-orthometric heights. Discussion of methods and results in both parts.			2.0		E4.4a E4.1c
⋮	⋮	⋮		⋮	⋮	⋮
Total		**....**	.....	**.....**	**.....**	

Table 1: Example of a Module Schedule

Each assessment component (through exams, assignments, etc.) must be clearly defined and related to learning outcomes from the Standards. It must be supported with assignment specifications and assessment criteria (i.e. the way each assignment and exam is graded).

Where e-learning components are used, the expected student total working time for each component, the estimated number of tutor-student interaction hours, e-lecture schedule, tests, exercises, and the way the student study time is monitored should be provided.

The IBSC does not intend to be prescriptive in how the modules or sub-components of a Programme or Subject course are structured, but it requires that they be properly and fully related to the cross-reference table.

Texts and Reference Material

A list of texts and reference material used for each subject area, with an indication of the editorial house/publisher, and the year of publication should be provided. Where e-learning components are included, then a description of the e-learning materials, including their source, year of publication and a description of the material access method, should be submitted. The Board may require access to the e-learning platform and associated content.

[Comment: The Board will look to the adequacy and relevance of texts and reference materials. The section also serves as important feedback to the Board itself as to the availability of adequate and up to date teaching material. The IBSC wishes to ensure that students are adequately supported in terms of access and availability to required texts and reference material.]

Timeline

Provide a graphical representation (e.g. Gantt chart) of the complete programme or subject course schedule detailing the sequence in which all modules are delivered and assessed in chronological order.

CHAPTER 4: Student Assessment

Chapter 4 of the submission must include the following sections:

Student Assessment and Grading:

- Describe how a mark in each module is determined on the basis of assessment components within that module together with requirements for obtaining a pass.
- Describe how grades awarded within the Programme or Subject course are combined to give an overall grade and the requirement for award of recognition.
- Provide details of mechanisms to support students who fail a particular component of a Programme or Subject course.
- Describe how individuals are assessed in the final project (N/A for Single-Subject courses)

[Comment: The expectation of the IBSC is that all learning outcomes of the Standards will be assessed in some

form for example by examination, quiz, assignments, practical tasks, field-work, office-work or project tasks.]

Examination Papers

Representative examination papers, sample writing or self-guided assignments, and e-learning assessment components from the Subject course or from each *Subject* area taken by students during the programme (i.e. not only the final examination), must be submitted. For new programmes or subject courses, a prospective sample set must be provided.

[Comment: In reviewing a submission the Board will check that the format and level of the examinations and tests employed are appropriate to the learning outcomes required and the category of recognition sought. New submissions will be expected to have developed as a minimum an examining or testing strategy appropriate to the planned course.]

CHAPTER 5: Practical Exercises

Chapter 5 of the submission must include a list and details of all practical exercises, listed by *Essential* subject (S-5B/S-8B), *Foundation Science* subjects and *Hydrographic Science* subjects (S-5A) or *Cartographic Science* (S-8A) as described in section 4.1 must be provided. In summary, the requirement is that each practical exercise description must clearly explain what the students are expected to do. An example is provided in Table 2.

Practical Exercise	Programme module	Hours	S-5/S-8 (B or A) topic/element
…	…		
Leveling Demonstrate the operation of different kinds of levels and leveling rods To show knowledge of their principles of operation, sources of error and error minimization techniques	TP 771 Practical 2	2	F1.4a
Leveling Execution of a closed leveling line in small groups to achieve acceptable misclose results. .	TP 771 Practical 3	4	F1.4b
Leveling Calculation of heights using adjustment procedures.	TP 771 Practical 4	2	F1.4b
…	…		
Water level Level, install, set to work and calibrate a Water level gauge.	WL 789 Practical 1	4	H5.2a
…	…		
Hydrographic survey Prepare the hydrographic specifications for a given Hydrographic Survey Instruction for a complex survey scenario.	WS 743 Practical 1	5	H4.1b
…	…		
Hydrographic survey Install and calibrate single beam echo sounder equipment in a survey vessel.	WS 743 Practical 3	2	H4.2b
…	…		

Hydrographic survey Monitor and assess the real-time quality control during data acquisition with a multibeam system. Identify faults caused by incorrect speed of sound at transducer head and through water profile	WS 743 Practical 9	3	H6.1b
…	…		

Table 2: Example of the List of Practical Exercises

CHAPTER 6: Final Project

The Final Project must be coordinated and directly supervised by the institution.

A detailed and comprehensive narrative description of the Final Project (CFFP, CFCP, CMFP or CMCP) is to be provided. Describe the timescale and schedule. Explain student participation as groups or individuals, the assessment criteria for groups and individuals and who will conduct the assessment.

An example of the Final Project instruction (hydrographic or cartographic) as provided to the students and a sample of submitted student deliverables and reports must be included in the submission.

In addition, a final project description table must be completed in the specified template provided, as prescribed below. In this table the Final Project, whether CFFP, CFCP, CMFP or CMCP, should be described in terms of Task Outcomes. Tasks defined by the institution, must ensure that the programme content is covered in an integrated manner and, in accordance with the type of Final Project, reflects the orientation provided in 4.2. These tasks are to be cross-referenced to the **Essential**, **Foundation** or **Hydrographic/Cartographic Science** *elements*.

Guidance to Complete the Final Project Description Table

The project should consist of an integrated and cohesive project and be described as a series of phases and associated tasks (project activities) with each itemized as separate rows of the table (example in Table 3). Each task should be identified in the first column, and the other columns populated with attributes of that task.

The Task Outcome describes the intended result of the completed task. The required resources, equipment, software, data sources, etc. for each task are to be itemized. The number of hours devoted by the student to a particular task is to be itemized.

Each task should refer to the module identifier where that element was taught and to the related (S-5 or S-8) elements from the Standards.

Final Project (Hydrographic) Description Table (CFFP or CMFP)					
Phase & Task	**Task Outcome**	**Resources: equipment, software, data sources etc.**	**Hours**	**Programme Module(s)**	**Related S-5 topic/element**
Planning					
Task 1					
Task 2					
Task ……					
Preparation					
Task 1					
Acquisition					
Task 1					
Task 2					
Task 3					
Processing					
Task 1					

Task…					
Deliverables					
Reports					
Total			.....		

Final Project (Cartographic) Description Table (CFCP or CMCP)					
Phase & Task	**Task Outcome**	**Resources: equipment, software, data sources etc.**	**Hours**	**Programme Module(s)**	**Related S-8 topic/element**
Planning					
Task 1					
Task ……					
Preparation					
Task 1					
Task ……					
Acquisition & Processing					
Task 1					
Task.....					
Composition					
Task 1					
Task…					
Deliverables - Paper					
Deliverables - ENC					
Reports					
Total			.....		

Table 3: Final Project Description Tables

CHAPTER 7: Programme (or Subject) Cross-Reference Table

Purpose

The cross reference table provides important information used by the Board to assess submitted programmes and subject courses. This table contains a mapping of the total time devoted to teaching each *element* and *content* of the standards from all the teaching modules of the programme. This time is to be broken down into lectures (L), tutorial (Tu), practical (Pr), self-guided (SG) hours devoted to each *element/content* and learning outcome of the Standards. The information provided is required to demonstrate that every element's contents and learning outcomes are sufficiently covered in the subject modules of the programme.

Guidance to Complete the Cross-Reference Table

Submitting institutions MUST complete the cross-reference table in the template provided.

The **Module and Content** column and the **Hours** columns of the table are to be completed for each *subject/topic/element* of the standard as shown in the template.

For each *element*,

- **Module and content:** Identify each course module relevant to the element, indicate the module name/lecture and the list of content it is addressing.
- **Hours:** Indicate the number of teaching hours for the different categories of delivery.

Example – Table 4

In the example table below each *subject* is comprised of a list of topics which can be denoted by Ex.y and each topic contains elements which are denoted by <c1>, <c2>, etc.

The Module and Content column is to be populated with the name of each Module that addresses the element together with the content covered by this module. A breakdown of the associated hours of each L, Tu, P and SG is also to be included.

The time allocated to Subjects/Topics or Elements whose content is not aligned with the Standards should not be included in the cross reference table.

	Ex (subject)						
	Ex.y (topic)						
Element	**Content**	**Learning outcomes**	**Module and content**		**Hours**		
				L	Tu	Pr	SG
Ex.y<c1>	i. Content 1 ii. Content 2 iii. Content 3 iv. Content 4	Learning outcome Ex.y<c1>	GEOM302 (i)(iii)(iv) HYDRO304 (i)(vi) **SubTotal**	5 3 **8**	1 2 **3**	3 2 **5**	3 5 **8**
Ex.y<c2>	v. Content 5 vi. Content 6	Learning outcome Ex.y<c2>	HYDRO501 (ii)(iv)(v) **SubTotal**	8 **8**	2 **2**	4 **4**	
Total				**16**	**5**	**9**	**8**

Table 4: Cross Reference Table – Example of completion of Module and content, and Hours columns

CHAPTER 8: Student Feedback

The IBSC strives to ensure that quality control measures are in place and a part of this process involves consultation with the student body. It is important that students enrolled in the Programme or Subject course are able to contribute to development and change. Mechanisms such as student liaison meetings help in dealing with issues that arise during delivery. On completion of the Programme or Subject course a questionnaire should be circulated to solicit opinions on matters such as accessibility to resources and delivery of each course. Summary results from questionnaires should be included in the submission.

CHAPTER 9: Internal Review

Institutions are required to have in place an internal review process for the Programme or the Subject course proposal. It is recommended that any Programme or Subject course proposal will also undergo a comprehensive internal review every 3-5 years, to address any issues that may arise and to update course content.

The methodology adopted by the institution for the internal review will need to be furnished in detail. The summary of any recent internal review undertaken for a programme or subject proposal submitted for recognition will need to be included in the submission. This should not be taken as precluding newly developed programmes and subject course proposals not yet able to satisfy these items.

The Board wishes to see how feedback from all sources, including students, is formally taken into account within and by the Programme.

8. IBSC PROCEDURE FOR RECOGNITION OF PROGRAMMES AND SUBJECT COURSES

8.1 IBSC Review and Evaluation

(See ANNEX B for the **Application Process Flow Diagram)**.

The Board operates in accordance with its Rules of Procedures and Code of Ethics. The Board meets annually during March/April to review and evaluate programmes and single subject courses. The deadline of 31 December each prior year is chosen in order that submissions reach all Board members and the Secretary by mid-January. It is helpful for the IBSC in setting its work program to know as early as possible that a submission is being made.

The completeness of each submission will be checked to determine if it is eligible for Board review. A submission is declared eligible for review if:

- fees have been paid;
- the structure of the submission is in accordance with Chapter 7 of the Guidelines;
- information about each module in the programme or subject course is provided;
- the final project description table is provided; and
- the programme or subject course cross-reference table is provided.

[Comment: The above check is conducted by the Secretary and is restricted to reviewing the format and structure of the submission. It is not a qualitative assessment of the content, which is the responsibility of the Board.]

If the submission is ineligible, the institution will have to update the documentation by 31 January, with a complete version control table and text in track-changes. If the updated documentation is not provided by this deadline or if it does not meet the eligibility criterion for Board Review, the submission will not be reviewed. *Only eligible submissions will be reviewed.*

Since the Board is charged with reviewing a significant number of submissions each year as well as maintaining the Standards themselves, it is essential that submitting organizations assist with the Board's timing requirement. In the experience of the Board, the better submissions are those which are most straightforward for it to review and these are typically those prepared well ahead of the submission date and which have been thoroughly reviewed internally by the submitting organization.

8.2 Review Process

See ANNEX C for the **Procedure for Recognition of Programmes and Schemes Flow Diagram**.

Once a submission is declared eligible for Review, the Chair of the Board assigns it to a primary Review Team who are responsible for leading the detailed review. Between the 31 January and the IBSC meeting Board Members have the opportunity to review submissions individually. All Members of the Board will review all submissions in plenary at the annual meeting.

Should there be any contact between institutions and Board Members prior to the annual IBSC meeting, please note that any advice given is in good faith with the best intention of assisting the institution in preparing its

submission. It should not be construed as formal feedback from the IBSC. The institution should not expect that compliance with any requests or recommendations will necessarily result in recognition of the programme or subject course. The formal consideration and any decision relating to any programme or subject course can only be undertaken by the IBSC.

While not mandatory, **in the experience of the Board it is beneficial for a submitting organization to send a representative (a maximum of 3 persons) to the meeting where its submission will be reviewed.** The representative(s) should be qualified to respond authoritatively to questions posed or clarifications sought by the IBSC in plenary.

The Board's decision will be based on the following classifications which may include conditions to suit the specific circumstances of the submission.

1. **RECOGNIZED**: no further requirements or changes are necessary;
2. **COULD BE RECOGNIZED**: further requirements or changes are necessary in response to identified issues. The Board may request a "revised version" in the form of an entirely complete new set of documents with changes highlighted in a color other than black (e.g. red, blue). The revised version of the initial submission is to be submitted within a period specified by the Board and reviewed intersessionally;
3. **NOT RECOGNIZED**: a full resubmission is required, including all documentation required by the Standards and the Guidelines.

The Board will inform the submitting organization of its decision following the meeting by a formal letter explaining its decision and requirements.

8.3 Certificate of Programme Completion

Institutions providing a programme or subject course which has been recognized as outlined in section **2.2**, are encouraged to issue successful students with a certificate of programme or subject course completion. Such certificate may acknowledge that the Programme or subject course has received the Board's recognition, specifying the category of that recognition, as in the following example:

"This Programme (or Subject Course) has been recognized as meeting the requirements of the FIG/IHO/ICA S-5A/B or S-8A/B Standards of Competence for Category "A" (or "B") Hydrographic Surveyors or Standards of Competence for Category "A" (or "B") Nautical Cartographers and Geospatial Analysts"

Institutions can use the IBSC logo © for the following purposes:
- Website or brochures of the Programmes, Subject Courses or Schemes recognized by the IBSC,
- Certificates of Completion, awarded by the recognized Programmes, Subject Courses or Schemes to students or individuals, respectively.

Note: The logo artwork and Guidance on use of the IBSC logo © is available upon request from the IBSC Secretariat.

9. FOLLOW-UP OF RECOGNIZED PROGRAMMES BY THE IBSC

9.1 Programme Reviews and On-Site Visits

Institutions with recognized Programmes and S-5A/B Subject courses should be prepared to allow an IBSC visit, to view the facilities and to meet staff and students involved. The guidelines for the IBSC visit are:

9.1.1 **Scope**

A Programme review is a process for evaluating and continuously enhancing the quality and currency of Programmes. The evaluation is conducted through a combination of self-assessment, followed by peer on-site

consultation by the IBSC, for the mutual benefit of all parties. In addition, a visit serves to raise the profile of hydrography and nautical cartography with other in-country agencies and regionally. Reviews of S-5A/B Subject-level courses are similar but limited to the content and delivery of the recognized Subject course.

9.1.2 **Purpose of Programme Review**

The purpose of the on-site review is to confirm the internal review document presented by the host institution, in accordance with the Standards of Competence for Hydrographic Surveyors (S-5A/B) and the Standards of Competence for Nautical Cartographers (S-8A/B). This is designed to assess institutions' alignment of their Programmes with the Standards and to review educational processes.

9.1.3 **Internal Review Document**

A prerequisite for the on-site review is the submission of an internal review document prepared by the hosting institution covering a period of up to 5 years, from either: the last on-site review visit; or, commencement of the current Programme. This should be submitted in English at least one month prior to the on-site visit with content as indicated below:

- The Annual Review Document(s) as detailed in section **9.3**
- If requested, the final submission from the current recognized programme as presented to the Board for recognition
- Any changes to the course content, staff, delivery, facilities, field training, equipment and other resources
- Programme statistics relating to students including, entry, progression, completion and destinations (employment)
- Relevant institutional research

The Review Team will comprise two or three reviewers and the duration of the on-site review is typically two to three days.

Further documentation to be made available during the visit includes:

- A full set of programme documentation
- Exam papers and sample scripts
- Assignment specifications and sample submissions
- Specifications for practical exercises and field training with sample submissions
- Final project submissions
- Internal course assessment procedures and sample results
- Programme review documentation

9.1.4 **The On-Site Visit**

During the on-site visit the Review Team will undertake the following activities in accordance with a schedule that is agreed in advance with the hosting institution:

- Preliminary discussion:
  - Clarify the information provided in the Internal Review document
  - Outline the schedule and objectives for the on-site visit
- Meet current students, faculty members, administrators, and staff
- Meet former students and employers
- Visit classrooms, labs, survey vessels and other key facilities
- Provide oral feedback to the institution

9.1.5 **On-Site Visit Outcomes**

Within one month of the visit a written report detailing the findings and recommendations of the Review Team

for the programme will be provided to the hosting institution for response and sent to the Board. Recommendations made by the Review Team will be considered by the Board with possible outcomes as follows:

- Programme is satisfactory;
- There is a need for minor modifications that can be rectified internally by the hosting institution;
- The findings of the Review Team refer to major issues requiring significant changes to the documentation and/or practices as detailed in the report. Modifications are to be implemented within an agreed timeframe indicated by the Board and documentary evidence of the modifications will be required;
- The findings of the Review Team refer to major issues and therefore a new submission is required at a time to be agreed with the Board.

9.2 Register of Recognized Programmes and Schemes

Recognition is granted on the understanding that institutions undertake to update their programme/subject/scheme content according to changes in technology as reflected in the latest edition of the Standards. The IBSC reserves the right to monitor syllabi in conformity with the current published Standards. The Board annually updates its Register of Recognized Programmes, Subject courses, and Schemes, which is published in the Board Annual Meeting report. Programmes that have been recognized within the previous six (6) years are listed in this Register. To remain on the Register beyond six (6) years, programmes, subject courses, and schemes will need to be re-submitted against the then current Standards.

9.3 Annual Report for Recognized Programmes and Subject Courses

All institutions hosting a recognized Programme/Subject course must send a short annual report to the Board's Secretariat. A template is available from the IHO website.

The annual report should be provided by the end of January each calendar year and contain the following information:

Name of Programme/Subject: _____
Name of Contact Person: _____
_____Contact information: _____
_____Period Covered:
_____to _____

Programme/Subject Course Changes

- Describe any changes made to the programme/subject course such as structure, sequence or timing with a rationale.
- Describe any changes made to modules within a programme or subject course such as content and assessment strategy.
- Identify significant changes to key staff involved in delivery.

Statistics
The minimum statistical information/data concerning are required as follows:

- Number of students entering and their nationality.
- Number of students completing the programme or subject course

Internal Assessment
Internal assessment is the appraisal process performed by the institution responsible for the Programme or the Subject Course. Please provide a summary of feedback from students and staff and any action taken as a result.

Deadline for Annual Reports for Recognized Programmes and Subject Courses
Annual reports are to be submitted to the IBSC by 31 January, independent of the programme timeline.

9.4 Annual Reports for Recognized Schemes

All entities operating a recognized Scheme must submit a concise annual report summarizing the operation and any administrative changes to the Scheme over the previous calendar year.

The annual report should contain the following information:

Name of Scheme: _____
Name of Contact Person: _____
Contact information: _____
Period Covered: _____ **to** _____

The content of the report should include:

- a general description of the operation of the scheme, initiatives in promotion, relationships with other schemes or authorities, recognition by other parties, other relevant observations
- any changes that are being considered, proposed or implemented
- a table of the board/panel members, showing changes/dates of service
- the number of meeting held, dates, number of board/panel members in attendance and whether they were face to face or remotely
- the number of applications considered, the status of these applications, and details of pathways to certification applied for
- cumulative statistics summarizing applications since inception/recognition
- any planned future initiatives and
- any other information that the scheme considers may be of interest to the IBSC.

Deadline for Annual Reports for Schemes

Annual reports for Schemes are to be submitted to the IBSC by 31 January.

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ANNEXES

Annex A: S-5A/B and S-8A/B Checklist for Submitting Institutions

- ☐ Inform Chair and Secretary of intention to submit a programme or subject(s)for recognition (starting the dialogue)
- ☐ Prepare an internal project plan to meet 31 December deadline for submission (focus on deadline)
- ☐ Receive the invoice for payment of fees from the IHO Secretariat
- ☐ Pay fee and deliver submission (pay fees)
- ☐ Assemble the programme or subject(s) documentation into a single coherent submission in the English language, in .pdf format, that allows the ability to highlight text and allows content copying and commenting, with unique continuous page numbers, a contents page and a version control table, following the structure detailed in Chapter 7 of the Guidelines (checklist below).

  Note: once a submission has been accepted as compliant any further revisions that are subsequently provided must include a version control table (listing the changes) and tracked changes.

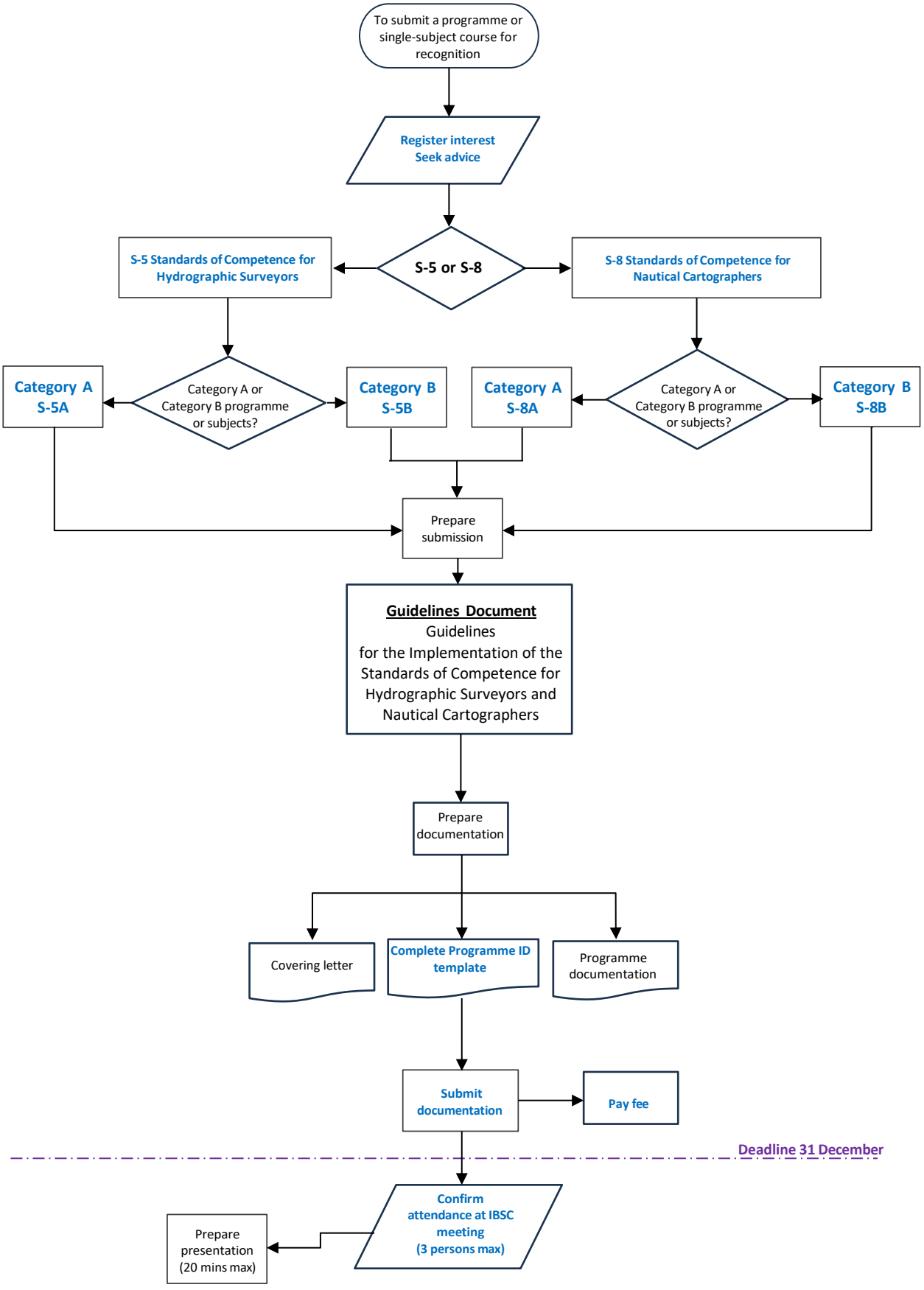
Checklist for Submissions – Refer to Guidelines Section 7 **(All items except item 6 are required for Discrete Subject Courses)**		
ITEM	TITLE	
1	General information on the programme	☐
1.1	Programme Identification	☐
1.2	Aims of the programme	☐
1.3	Entry requirements	☐
2.1	Staff list along with the courses taught by each one of them	☐
2.2	Facilities available to students	☐
3.1	Programme structure	☐
3.2	Information about each module in the programme with the respective module breakdown	☐
3.3	Texts and reference material	☐
3.4	Timeline	☐
4.1	Student assessment and grading	☐
4.2	Examination papers	☐
5	Practical Exercises	☐
6	Final Project (CFFP, CFCP, CMFP or CMCP) Description Table – **must be completed in the specified template provided** (section 7.6.1)	☐
	Project specification (hydrographic or cartographic instruction) as provided to students for the final project	☐
	Sample of deliverables and reports submitted by students for the final project	☐
7	Programme Cross-reference table – **must be completed in the specified template provided**	☐
8	Student Feedback	☐
9	Internal Review	☐

- ☐ Submit the programme documentation to the Secretary at adcc@iho.int by the deadline (focus on final

submission)

☐ Inform Chair and Secretary of attendance at the IBSC meeting (focus on meeting and presentation)

Annex B: Application Process Flow Diagram for all Programmes and S-5A/B Single-Subject Courses



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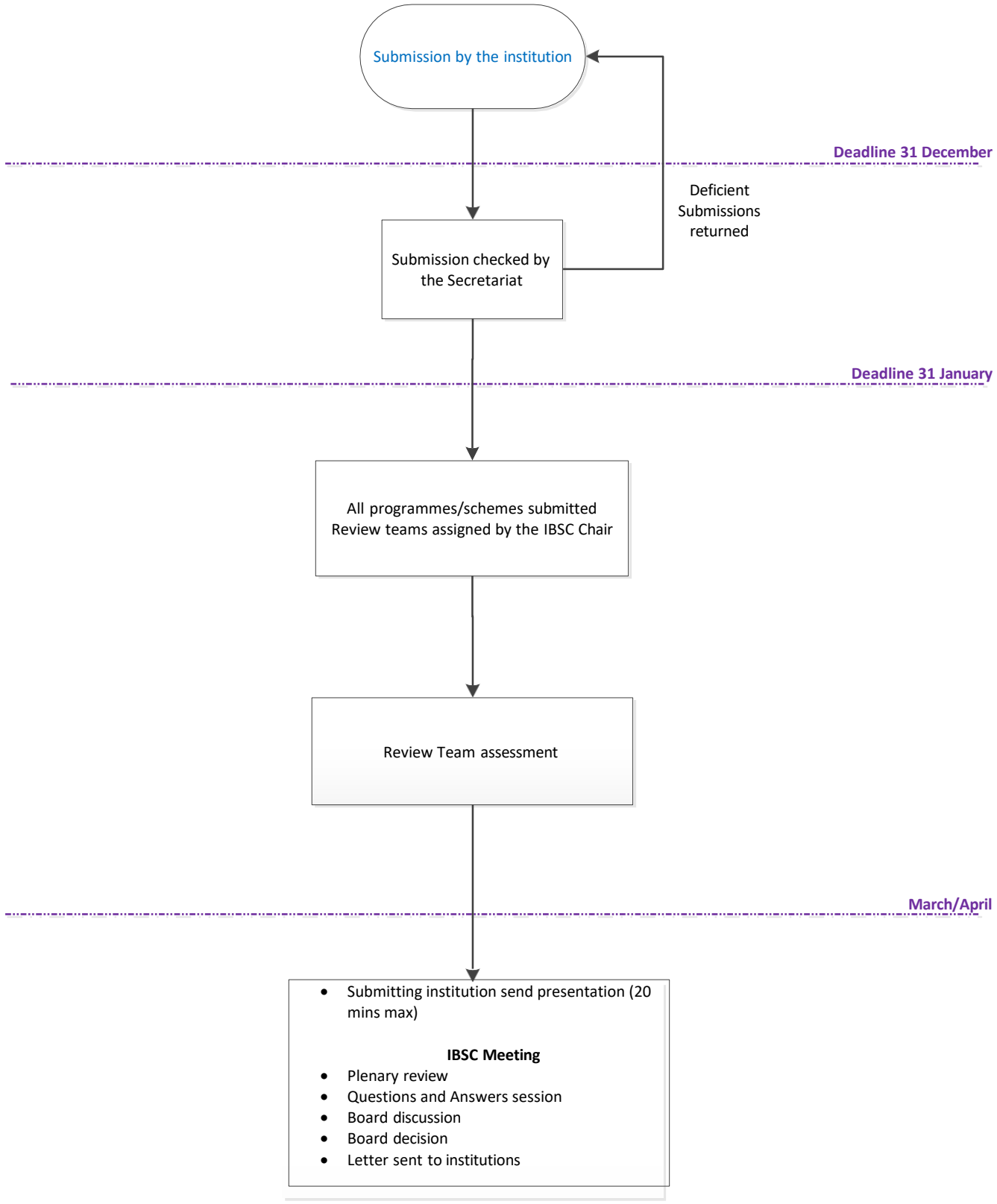
Annex C: Procedure for Recognition of Programmes, S-5A/B Subject Courses, and Schemes Flow Diagram



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