

# **The Establishment of Hydrography and Marine Technology Programme (UTM HYDRO III) for Malaysian Professional Land Surveyors**

**Mohd Hilmi Abdullah, Mohd Noor Isa, Hanafiah Hassan, Najhan Md Said, Ismail Harun, Mohd Zaid Abdullah, Mohammad Azmi Mohd Zin, Shaharuddin Musa, Md Rodi Ismail, Mohd Nazam Sulaiman and Khairulnizam M.Idris (Malaysia)**

**Key words:** Hydrography and Marine Technology Programme, UTM HYDRO III, Malaysian Professional Land Surveyors

## **SUMMARY**

The establishment of Hydrography and Marine Technology Programme (UTM HYDRO III) that meets the FIG/IHO/ICA Category 'A' standard plays a vital role to hydrographic surveying industry and education in order to keep hydrographic industry relevant to current technologies and surveying needs. UTM HYDRO III provides essential aspects such as industrial collaboration and comply with the new standard known as FIG/IHO/ICA Standards of Competence for Category 'A', Publication S-5A, First Edition, Version 1.0.1–June 2017. This programme is designed for members of the Malaysian Professional Land Surveyors consisting of Licensed Land Surveyors and Registered Land Surveyors in Peninsular Malaysia and East Malaysia (Sabah and Sarawak). UTM HYDRO III is the first programme organised by UTM in collaboration with three different agencies comprising of the National Hydrographic Centre (NHC), the Department of Survey and Mapping Malaysia (DSMM), and Land Surveyors Board Malaysia (LJT). The cooperation between various agencies and education institution is to ensure the hydrographic education provides comprehensive knowledge in line with hydrography development and continuous learning among Land Surveyors in Malaysia. In terms of educational studies, all relevant sides have managed the syllabus of hydrographic education and the learning process criteria that meets the requirement of hydrographic industry. The theory and practice has to be clearly delivered for education purposes to meet the standards of the current technologies. Apart from the theories and practical laboratory exercises, UTM HYDRO III's programme provides hydrographic practical exercise that train the students to conduct comprehensive hydrographic survey operation in accordance to IHO Standards. The Standards of operation and guidelines for hydrographic survey practical will be conducted and monitored by NHC. Hence, UTM HYDRO III is a platform to train land surveyors professionally in line with the latest technologies in hydrography and to ascertain their expertise is recognised at international level. This paper will focus on the structure of UTM HYRO III and the benefit of this programme towards the land surveyors and the country.

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## **1. INTRODUCTION**

The practice of Malaysian Professional Land Surveyors are often involved in a range of surveying activities such as cadastral surveys, geodetic surveys, topographical surveys, engineering surveys, photogrammetry and hydrographic surveys. In recent years, the demand for hydrographic surveys are increasing due to the rapid development of ports and coastal engineering, offshore oil and natural gas exploitation. These are high economic value industries but it is also high risk industries that require regular monitoring in order to avoid the potential of adverse environmental impact. The varied and dynamic nature of this coastal and offshore area dictates the frequency of hydrographic survey operations. Thus, it is essential to ensure hydrographic survey are conducted accordingly to the standards by competent personnel.

Over the past decades, Malaysian Professional Land Surveyors has conducted hydrographic survey and the scope of their work are focused on territorial waters, inland waters, river, tidal observation and analysis, and coastal engineering surveys. In line with the requirement of coastal and asset management industry, Malaysian Professional Land Surveyors need to fulfil the international hydrographic standard in the implementation of hydrographic survey works. The establishment of Hydrography and Marine Technology Programme (UTM HYDRO III) that meets the FIG/IHO/ICA Category 'A' standard is an effort to train and expose Malaysian land surveyors towards the international standards, development and market demands in hydrographic surveys. This programme is designed for Malaysian Professional Land Surveyors in order to participate in international programme and to train them professionally in line with the current developments of hydrography. In addition, UTM HYDRO III is important for land surveyors to ascertain their expertise is recognised either on a national or international level.

## **2. AIM OF THE PROGRAMME**

The main aim of the Hydrography and Marine Technology Programme (UTM HYDRO III) is to train and expose a Malaysian Professional Land Surveyors towards the development and market demand within the mapping and marine industry. UTM

~~HYDRO III's programme is an effort to ensure the Malaysian Professional Land Surveyors are kept in tandem with the latest technological developments and to meet the~~  
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growing customer demands for diversification of products and geospatial information availability services. The modules in this programme consist of theories, laboratory work and field practical in real maritime environment by using the latest technologies and innovations. The programme is delivered on modular approach at UTM Kuala Lumpur, Malaysia.

### **3. AGENCIES**

Universiti Teknologi Malaysia (UTM) is collaborating with the National Hydrographic Centre (NHC), Department of Survey and Mapping Malaysia (DSMM) and Land Surveyors Board Malaysia (LJT). These four agencies and institutions are the main pillar in organising this programme. The collaboration is to ensure that the structure of the UTM HYDRO III is designed in accordance with the FIG/IHO/ICA Standards of Competence for Category 'A' and provides comprehensive hydrographic knowledge for Malaysian Land Surveyors to be expertise in hydrography.

UTM HYDRO III is conducted by UTM under the Faculty of Built Environment and Surveying (formerly known as Faculty of Geoinformation and Real Estate). UTM is the only academic institution in Malaysia that has been recognised by FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyor and Nautical Cartographers (IBSC) to conduct Professional Hydrographic Programme since 1995. In order to achieve the objectives of UTM HYDRO III, all relevant sides have managed the syllabus of hydrographic education and learning process according to their expertise.

### **4. DEVELOPMENT OF HYDROGRAPHY AND MARINE TECHNOLOGY PROGRAMME (UTM HYDRO III)**

The idea to establish the Hydrography and Marine Technology Programme (UTM HYDRO III) was made by the Director General of the Department of Survey and Mapping Malaysia (DSMM) in July 2017. The purpose of UTM HYDRO III programme is to give a continuing professional development for Malaysian Professional Land Surveyors with comprehensive and broad-based knowledge in all aspects of the theory, current technologies and practice of hydrographic surveying, and allied with discipline. Furthermore, the establishment of UTM HYDRO III is to keep and expose the Malaysian Professional Land Surveyors with the new standards in hydrographic activities.

The UTM HYDRO III Management Committee was initiated by the Director General of DSMM, comprising of , of DSMM, NHC, LJT, UTM and PEJUTA. The main aim of this committee is to establish and manage a international hydrographic programme for Malaysian Professional Land Surveyors. A series of meeting and discussion took place to design the syllabus of UTM HYDRO III that comply with the new standard known as FIG/IHO/ICA Standards of Competence for Category 'A' (Publication S-5A, First Edition, Version 1.0.1–June 2017).

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In order to fulfill this Standard prescribed by IBSC, the UTM HYDRO III Management Committee has considered the experience of Malaysian Professional Land Surveyors to attend this programme according to the designed syllabus. The document of UTM HYDRO III was approved by NHC and forwarded to IBSC.

On 31 December 2017, the submission UTM HYDRO III was submitted to IBSC and the presentation was held on 23 April 2018 during the 41th meeting of the IBSC at the Institute of Technology Bandung, Indonesia. The UTM HYDRO III was presented to IBSC by Prof. Sr Dr. Mohd Razali Mahmud (Universiti Teknologi Malaysia), Sr Mohd Noor Isa (Director General of Department of Survey and Mapping Malaysia), Rear Admiral Hanafiah Hassan (Director General of National Hydrographic Centre) and Sr Mohd Hilmi Abdullah (Department of Survey and Mapping Malaysia). The UTM HYDRO III was granted recognition subject to corrections.



**Figure 1:** Sr Mohd Noor Isa and Malaysian delegates with Mr. Adam Greenland, Chairman of IBSC after presentation UTM HYDRO III Programme

The UTM HYDRO III programme is recognised by the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyor and Nautical Cartographers (IBSC) developed by four different agencies. The UTM HYDRO III's establishment phases are as shown in Figure 2.

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**Figure 2:** UTM HYDRO III's establishment phases

## 5. CHALLENGING PHASE ON HYDROGRAPHY AND MARINE TECHNOLOGY PROGRAMME (UTM HYDRO III)

The challenging points during the Hydrography and Marine Technology Programme (UTM HYDRO III) are as shown below:

- a. Comply with the new standard known as FIG/IHO/ICA Standards of Competence for Category 'A', Publication S-5A, First Edition, Version 1.0.1–June 2017.
- b. Implementation of theories and principles with current technologies in Category 'A' syllabus.
- c. Syllabus designed to comply with the standard and parallel with experiences of Malaysian Professional Land Surveyors.

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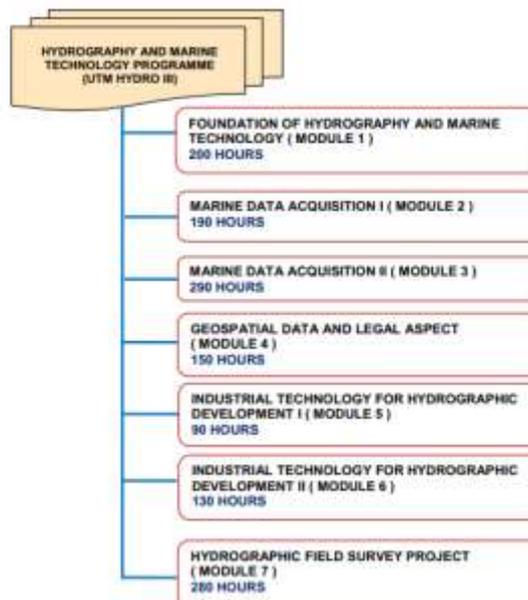
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## 6. PROGRAMME STRUCTURE

In overall, the Hydrography and Marine Technology Programme (UTM HYDRO III) has been designed to be flexible with the programme being delivered in 42 weeks (6-8 hours/day) by modular approach. The programme is designed with seven (7) modules and it offers the adaptable and flexible mode to complete this programme in two years.

### 6.1 Modules of Hydrography and Marine Technology Programme (UTM HYDRO III)

The programme contains a series of modules and formal training sessions as well as additional practices, tutorials and field experience. The total class duration is 1,330 hours and it has been divided according to the structured subjects in this programme. Figure 3 shows the details of the programme structure



**Figure 3:** Modules and duration of Hydrography and Marine Technology Programme (UTM HYDRO III)

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## 6.2 Details of Programme Structure

The programme structure is designed for 42 weeks. This comprises of lectures, tutorials, laboratory exercises and in-campus field exercises that are equivalent to 1,050 class hours and 7 weeks of Hydrographic Field Survey Project. In summary, the total duration of Hydrography and Marine Technology Programme (UTM HYDRO III) is 1,330 hours that can be divided as follows:

- a. Theory (513 hours)
- b. Tutorials (169 hours)
- c. Practical (66 hours)
- d. Self-Guided (177 hours)
- e. Assignment (79 hours)
- f. Examinations (46 hours)
- g. Hydrographic Field Survey Project (280 hours)

The program structure is divided into seven (7) modules with fourteen (14) subjects as shown below:

- a. **Module 1** : Foundations of Marine Technology
  - Mathematics and Statistic
  - Computer Programming
  - Physics
- b. **Module 2** : Marine Data Acquisition I
  - Geodesy
  - Tides, Theory and Practice
- c. **Module 3** : Marine Data Acquisition II
  - Hydrographic Positioning
  - Hydrographic Surveys
- d. **Module 4** : Geospatial Data Development and Legal Aspect
  - Hydrographic Information
  - Law of the Sea
- e. **Module 5** : Industrial Technology for Hydrographic Development I
  - Seamanship and Navigation
  - Marine Meteorology

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- f. Module 6 : Industrial Technology for Hydrographic Development II
  - Dynamic Oceanography and Sedimentology
  - Remote Sensing
  
- g. Module 7 : Hydrographic Field Survey Project

## 7. HYDROGRAPHIC FIELD SURVEY PROJECT

The main aim of Hydrographic Field Survey Project is to expose the students with experience by combining the material covered in the previous modules and to supply the hands-on experience with field equipment which is not available in the classroom. In this field project, a comprehensive survey operation starting from survey planning which includes collecting data from the existing records, establishing survey control, and hydrographic data acquisition, up to the completion of the field sheet in the form suitable to be submitted to the field sheet checking unit. Apart from manual entry, the students will also be exposed to the use of hydrographic softwares i.e. real-time data acquisition system and post-processing software. All these are covered in chronological order and each Malaysian Professional Land Surveyors works on every aspect of the survey. The Hydrographic Field Survey Project will be conducted with multibeam survey and other related hydrographic sensors.



**Figure 4:** Hydrography Survey Vessel (NHC)

Most of the system and vessel (Figure 4) currently used for the practical Hydrographic Field Survey Project belongs to NHC. The vessel will be optimised for shallow water applications and equipped with multibeam echo sounder system and single beam echo

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sounder, a sub bottom profiler, side scan sonar, inertial navigation system, GNSS positioning and etc.

## 8. 1<sup>st</sup> HYDROGRAPHY AND MARINE TECHNOLOGY PROGRAMME (UTM HYDRO III)

The first Hydrography and Marine Technology Programme (UTM HYDRO III) started from 5 October 2018 and will ends on 4 August 2019. The Opening Ceremony was officiated by the Director General of Department of Survey and Mapping Malaysia (Figure 5). The UTM HYDRO III is attended by a total of 18 Malaysian Professional Land Surveyors **as shown** in Figure 6. The programme was delivered on modular approach at UTM Kuala Lumpur, Malaysia.



**Figure 5:** Opening Ceremony of UTM HYDRO III

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**Figure 6:** Students in the Classroom UTM HYDRO III

## **9. BENEFITS OF HYDROGRAPHY AND MARINE TECHNOLOGY PROGRAMME (UTM HYDRO III)**

The Hydrography and Marine Technology Programme (UTM HYDRO III) is a programme that is designed to expose the Malaysian Professional Land Surveyors to theory, principle and standard of operation in conducting hydrographic survey activity in accordance with predetermined standards. The Continues Professional Development (CPD) in hydrographic field will open the students to a broader field of career and professionalism. This programme will produce a competent Malaysian Professional Land Surveyors that can be Malaysian Subject Matter Expert in hydrographic surveying.

## **10. CONCLUSION**

The UTM HYDRO III has made a significant contribution towards ensuring that the Malaysian Professional Land Surveyors is expose to the current hydrographic surveys technologies that follows the hydrography standards or standards of procedure especially on engineering, safety of navigation and marine explorations in Malaysian Waters. The certification of UTM HYDRO III that meets a Category 'A' standard will provides additional confidence in the survey activities by the Malaysian Professional Land Surveyors.

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## **BIOGRAPHICAL NOTES**

Mohd Hilmi Abdullah started his career with the Department of Survey and Mapping Malaysia (DSMM) on 15 July 2016. He currently serves as Assistant Director Surveyor at Innovation and Documentation Division. Mohd Hilmi Abdullah holds a Master's Degree in Hydrography and he is pursuing a Doctoral Degree in Hydrography at Universiti Teknologi Malaysia. He is one of the key people in the establishment of the Hydrography and Marine Technology Programme (UTM HYDRO III) since the beginning until being recognised by the FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC).

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