Hydrographic Education and Training at Universiti Teknologi Malaysia

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Commission No. 4

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Universiti Teknologi Malaysia (UTM), is one of Research Universities in Malaysia. The main campus is located in Johor Bahru, south of Peninsular Malaysia and UM City Campus is located in Kuala Lumpur, the capital city of Malaysia. Universiti Teknologi Malaysia is one of the academic institutions in Malaysia that offers hydrographic courses in Malaysia.

UTM Vision & Mission

**Vision**
To be recognised as a world-class centre of academic and technological excellence

**Mission**
To be a leader in the development of human capital and innovative technologies that will contribute to the nation’s wealth creation
## UTM Quick Facts

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established</td>
<td>1904</td>
</tr>
<tr>
<td>Type</td>
<td>Research University</td>
</tr>
<tr>
<td>Vice Chancellor</td>
<td>Prof. Ir. Dr. Wahid bin Omar</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>12,883</td>
</tr>
<tr>
<td>PhD Students</td>
<td>4,455</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>11,392</td>
</tr>
<tr>
<td>International Student</td>
<td>5,043</td>
</tr>
<tr>
<td>Campus</td>
<td>UTM Johor Bahru Campus</td>
</tr>
<tr>
<td></td>
<td>UTM Kuala Lumpur Campus</td>
</tr>
</tbody>
</table>

(as at 30 June 2013)

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### S&T Based Faculties
- **13**

### Non S&T Based Faculties
- **8**

### Research Alliances
- **10**

### Research Centres
- **26**

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UTM Faculties and Schools

<table>
<thead>
<tr>
<th>S&amp;T</th>
<th>Non S&amp;T</th>
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</thead>
<tbody>
<tr>
<td>Science</td>
<td>Built Environment</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Management</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Education</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>International Business School</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Islamic Civilization</td>
</tr>
<tr>
<td><strong>Geoinformation &amp; Real Estate</strong></td>
<td>Perdana School of S&amp;T Policies</td>
</tr>
<tr>
<td>Bioscience &amp; Medical Engineering</td>
<td>School of Graduate Studies</td>
</tr>
<tr>
<td>Biomedical &amp; Health Sciences</td>
<td>School of Professional and Continuing Education</td>
</tr>
<tr>
<td>Computing</td>
<td></td>
</tr>
<tr>
<td>Petroleum Engineering &amp; Renewable Energy</td>
<td></td>
</tr>
<tr>
<td>Razak School of Advanced Engineering Management</td>
<td></td>
</tr>
<tr>
<td>Advanced Informatics School</td>
<td></td>
</tr>
<tr>
<td>Malaysian-Japan International Institute of Technology</td>
<td></td>
</tr>
</tbody>
</table>

UTM Research Alliances

Research Alliance

- Construction
- Infocomm
- Water
- K-Economy
- Transportation
- Nanotechnology
- Bio-Tech
- Material & Manufacturing
- Energy
- Sustainability
Faculty of Geoinformation and Real Estate (FGRE) was established on 14 Mac 1972. Presently, it comprises of two academic departments:

- Department of Geoinformation
- Department of Real Estate
Undergraduate Programmes

Bachelor of Engineering (Geomatic)
Bachelor of Science (Geoinformatic)
Bachelor of Science (Property Management)
Bachelor of Science (Land Administration and Development)

Master of Science (MSc) by Taught Course

Master of Science (Geomatic Engineering)
Master of Science (Geoinformatic)
Master of Science (Remote Sensing)
Master of Science (Land Administration and Development)
Master of Science (Real Estate)
Master of Science (Remote Sensing)
Master of Science (Asset and Facilities Management)
Master of Science (MSc) and Doctor of Philosophy (PhD) by Research

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Research Groups

- Geomatic Engineering
- Geoinformatics
- Remote Sensing
- Satellite Surveying
- Satellite Navigation
- Industrial Surveying
- Hydrography
- Real Estate
- Facilities Management
- Land Administration and Development

- GNSS & Geodynamics
- Photogrammetry & Laser Scanning
- 3D GIS
- Research Groups
- Tropical Map
- Real Estate Economics
- Industri Asset & Facilities Management
Short courses conducted in UTM:

- UTM HYDRO I Course
- UTM HYDRO II Course
- Short Courses on Tides
- Short Courses on Multibeam
- Short Courses on Marine Cartography
- Short Courses on FUGRO Employee Worldwide

Course in Hydrography

- Course in Hydrography UTM-HYDRO I Course (FIG/IHO/ICA Category B) with options to Hydrography to Support Port Management and Coastal Engineering (Option 2), and Inland Waters Hydrography (Option 7) based on S-5 Eleventh Edition version 11.01.May 2011 Standard.
In early 1990s with the initiative of Canadian International Development Agency (CIDA) under the influence of Mr. Tom McCollugh a professional hydrographic course was planned to be conducted in UTM.

International Advisory Board was formed for the project that comprised of CIDA, UTM, Royal Malaysia Navy (RMN) and Institute of Surveyors Malaysia (ISM).

In 1995, the International Federation of Surveyors (FIG) and International Hydrographic Organization (IHO) Advisory Board has recognized the HYDRO I course as meeting their Category B standards for the training of hydrographic surveyors and granted UTM a license to run the courses for the next five years.

In 2007, the UTM-HYDRO I was re-accredited for another six years.

Again in 2013, the third recognition was obtain from the FIG/IHO to run the HYDRO I Course in UTM.
UTM-HYDRO I Course

• UTM-HYDRO I which is equivalent to Category B is recognized by the International Hydrographic Organization (IHO) of the International Federation of Surveyors (FIG).

• 24 weeks of intensive course that covers all related subjects on hydrography.

Programme Duration

• This programme contains series of module and formal training sessions as well as additional practices, tutorials and field experiences.

• An intensive course that covers all related subjects on hydrography with total class duration of 30-32 hours per week.

• In total, the programme takes 24 weeks; divided into:
  – Lectures, tutorials, lab exercises, in-campus field exercises and examinations (20 weeks)
  – Hydrographic Field Survey Project (4 weeks)
### Aim & Objective of the Course

To produce hydrographic surveyors that fulfill the standards of competence for hydrographic surveyors according to the S-5 Standards of the International Hydrographic Organisation.

Each participant should be able to:

- To understand any hydrographic surveying project professionally and efficiently
- Participate effectively and productively in hydrographic surveys

### Programme Mode, Code, Subjects and Credit Hours

The syllabus and the number of teaching hours that comprise the topics are presented:

<table>
<thead>
<tr>
<th>NO</th>
<th>Mode</th>
<th>Code</th>
<th>Subject</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>MA</td>
<td>Mathematics</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>CP</td>
<td>Computer Programming</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>PT</td>
<td>Physics Theory</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>PA</td>
<td>Applied Physics</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>GE</td>
<td>Geodesy</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
<td>GS</td>
<td>Geodetic Surveys</td>
<td>48</td>
</tr>
<tr>
<td>7</td>
<td>E</td>
<td>ES</td>
<td>Hydrographic Positioning</td>
<td>44</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>TI</td>
<td>Tides: Theory and Practice</td>
<td>42</td>
</tr>
<tr>
<td>9</td>
<td>O</td>
<td>RS</td>
<td>Remote Sensing</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>E</td>
<td>HS</td>
<td>Hydrographic Surveys</td>
<td>98</td>
</tr>
<tr>
<td>11</td>
<td>E</td>
<td>HI</td>
<td>Hydrographic Information</td>
<td>32</td>
</tr>
<tr>
<td>12</td>
<td>E</td>
<td>OS</td>
<td>Dynamic Oceanography and Sedimentology</td>
<td>36</td>
</tr>
<tr>
<td>13</td>
<td>O</td>
<td>HP</td>
<td>Port and Coastal Engineering</td>
<td>32</td>
</tr>
<tr>
<td>14</td>
<td>E</td>
<td>RM</td>
<td>Marine Meteorology</td>
<td>18</td>
</tr>
<tr>
<td>15</td>
<td>E</td>
<td>SN</td>
<td>Seamanship and Navigation</td>
<td>46</td>
</tr>
<tr>
<td>16</td>
<td>E</td>
<td>LS</td>
<td>Law of the Sea</td>
<td>12</td>
</tr>
<tr>
<td>17</td>
<td>P</td>
<td>FS</td>
<td>Hydrographic Field Survey Project</td>
<td>120</td>
</tr>
</tbody>
</table>
Entry Qualification – HYDRO I

- At least Certificate or Diploma in Land Surveying/Geomatic Engineering/Civil Engineering or other related fields.

Course Assessment

<table>
<thead>
<tr>
<th>GROUP I (Weight 1)</th>
<th>GROUP II (Weight 2)</th>
<th>GROUP III (Weight 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• MA</td>
<td>• RS</td>
<td>• GE2</td>
</tr>
<tr>
<td>• CP</td>
<td>• SN</td>
<td>• HS2</td>
</tr>
<tr>
<td>• PT</td>
<td>• LS</td>
<td>• HI2</td>
</tr>
<tr>
<td>• PA</td>
<td>• RM</td>
<td>• ES2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• TI2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• OS2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HP2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HFSP</td>
</tr>
</tbody>
</table>
Course Assessment

The student will fail if they obtain:

i) One grade under 40.0 or more than two grades between 40.0 and 50.0 in the subjects of GROUPS I and II.

ii) One grade under 50.0 in any subject of GROUP III.

iii) An average in any group of the subjects under 50.0.

iv) A final average of the instructions under 50.0.

v) One grade under 50.0 in the project.

UTM-HYDRO II Course

• UTM-HYDRO II course which is equivalent to Category A is recognized by the International Hydrographic Organization (IHO) of the International Federation of Surveyors (FIG).

• Five months of lectures and practical.
• In 1998, UTM was first granted recognition to conduct the HYDRO II Course (FIG/IHO Category A) with first HYDRO II course was conducted in 1999.

• UTM was granted re-recognition to conduct the HYDRO II Course (FIG/IHO Category A) in 2008.

• Again in 2014, UTM has been granted to conduct the HYDROII Course for another 4 years.

Entry Requirements

• At least Degree in Land Surveying or Geomatic Engineering or Civil Engineering or other related fields.

OR

• Fully accredited UTM HYDRO I (FIG/IHO/ICA) or Category B (FIG/IHO/ICA) certificate with at least 7 years experience in hydrographic surveying

• (applicant with this qualification is required to submit a log book for evaluation and consideration by the Organizing Committee)
The programme contains:

• Series of modules and formal training sessions.
• Additional practices, tutorials and field experience.
• The total class duration per week is between 26 to 30 hours.
In summary, the total duration of HYDRO II is **1270 hours** that can be divided as follows:

a. **Theory (663 hours)**
b. Tutorials, Lab Exercises, In-Campus Field Exercises **(319 hours)**
c. Examinations **(48 hours)**
d. Hydrographic Field Survey Project **(240 hours)**

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The syllabus and the number of teaching hours that comprise the topics are presented:

<table>
<thead>
<tr>
<th>Programme Mode, Code, Subjects And Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="chart" alt="Programme Mode, Code, Subjects And Credit Hours" /></td>
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</tbody>
</table>

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Programme Mode, Code, Subjects And Credit Hours

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<th>MODE</th>
<th>CODE</th>
<th>SUBJECTS</th>
<th>HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>MA2</td>
<td>Mathematics and Statistic</td>
<td>96</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>CP2</td>
<td>Computer Programming</td>
<td>88</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td>PY2</td>
<td>Physics</td>
<td>82</td>
</tr>
<tr>
<td>4</td>
<td>E</td>
<td>GE2</td>
<td>Geodesy</td>
<td>72</td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>ES2</td>
<td>Hydrographic Positioning</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
<td>TI2</td>
<td>Tides: Theory and Practice</td>
<td>80</td>
</tr>
<tr>
<td>7</td>
<td>O</td>
<td>RS2</td>
<td>Remote Sensing</td>
<td>36</td>
</tr>
<tr>
<td>8</td>
<td>E</td>
<td>HS2</td>
<td>Hydrographic Surveys</td>
<td>160</td>
</tr>
<tr>
<td>9</td>
<td>E</td>
<td>HZ2</td>
<td>Hydrographic Information</td>
<td>70</td>
</tr>
<tr>
<td>10</td>
<td>E</td>
<td>CB2</td>
<td>Dynamic Oceanography and Sedimentology</td>
<td>70</td>
</tr>
<tr>
<td>11</td>
<td>O</td>
<td>HR2</td>
<td>Port and Coastal Engineering</td>
<td>59</td>
</tr>
<tr>
<td>12</td>
<td>E</td>
<td>RM2</td>
<td>Marine Meteorology</td>
<td>42</td>
</tr>
<tr>
<td>13</td>
<td>E</td>
<td>SN2</td>
<td>Seamanship and Navigation</td>
<td>67</td>
</tr>
<tr>
<td>14</td>
<td>E</td>
<td>LS</td>
<td>Law of the Sea</td>
<td>36</td>
</tr>
<tr>
<td>17</td>
<td>P</td>
<td>PS</td>
<td>Hydrographic Field Survey Project</td>
<td>240</td>
</tr>
</tbody>
</table>

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Facilities Available in UTM

UTM HYDRO I/II Classroom Room

Engineering and Cadastral Survey Laboratory (1)
Facilities Available in UTM

Engineering and Cadastral Survey Laboratory (2)

Engineering and Cadastral Survey Laboratory (3)

Hydraulic and Hydrology Laboratory (building and boat) – (1)

Hydraulic and Hydrology Laboratory (pool) – (2)
Facilities Available in UTM

Marine Technology Centre (1)

Marine Technology Centre (2)

UTM Main Library (Sultanah Zanariah Library)

UTM Main Library (24 Hours Study Room)

Physics Laboratory (Fiber Optics Technology Laboratory) (3)
Facilities Available in UTM

Activities in Hydrographic Field Survey Project
Activities in Hydrographic Field Survey Project

Side Scan Sonar survey - system onboard

Multibeam data processing: patch test calculation

Activities in ALAM, Melaka

Seamanship and Navigation Module conducted in ALAM, Melaka

Training Facilities Survival at Sea, Swimming Pool, ALAM (1)

Training Facilities Survival at Sea, Swimming Pool, ALAM (2)

Ship Simulator Laboratory, ALAM (1)
Conclusions

- The two HYDRO I and II courses receive continuous demand and support from private and government sectors.

- Many of these agencies that involves in hydrographic works realised the needs of these hydrographic professional courses (HYDRO I and II) in conducting the hydrographic survey.

- Since early 2000, many UTM graduates (Diploma and BSc Geomatic) have been employed by companies in hydrographic surveying.

Conclusions

- Due to Oil and Gas activities, more Malaysian currently involves in offshore surveying, working with local and international companies.

- UTM is well known as an established institution conducting HYDRO I and II (FIG/IHO/ICA UTM Category A and B equivalent) hydrography course in South East Asian region.

- 17 UTM-HYDRO I Courses (1995-2014)
- 7 HYDRO II Courses (1999-2013)
Conclusions

• UTM is the first academic institution in this part of the region that offers these two professional courses HYDRO I and II to surveying and marine communities in Malaysia and its neighbouring countries like Singapore, India, Maldives, Sri Lanka, Indonesia and Brunei and other countries as far as Oman, UAE and Nigeria.

Acknowledgement

• Financial assistance from Malaysian Peninsula Land Surveyors Board (LJT).
Thank you for your attention!

Rusli Othman

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