

## Undergraduate and postgraduate Programmes in Remote Sensing At University Technology Malaysia

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### Abstract

The Faculty of Geoinformation Science and Engineering at University technology Malaysia has been offering B.Sc programmes in land surveying and poverty management since 1972. However, with the increasing needs for professionals in other fields such as remote sensing, geoinformatics and land administration & development , the Faculty now offers three more new courses, namely :1) B.Sc (Remote sensing ) , (2) B.Sc (Geoinformatics), and (3) B.Sc (Land Administration & Development ) . The Faculty also has been offering postgraduate programmes related to geomatic engineering, remote sensing, geoinformatics, GPS surveying, hydrography, property management and land administration & development. This paper presents an overview of the undergraduate and postgraduate programmes in remote sensing at the Faculty.

### Introduction

Education in remote sensing and related technologies has its roots from the undergraduate programme in land surveying at the Faculty of Surveying and Real Estate (now called geomatic engineering at the Faculty of Geoinformatic Science & Engineering). Remote sensing has been taught as compulsory subject as well as an optional subject in the course. However, with the increasing importance given to remote sensing in order to fulfill the human resources development needs of the country, a four-year undergraduate programme was started in May 1997 at the Faculty leading to B.Sc (HONS.) Remote Sensing degree. The postgraduate programmes in remote sensing have been offered since 1998.

### Course Structure and Curriculum

#### a. Undergraduate Programme

This programme which consists of 127 credit hours gives emphasis sciences, core and main core remote sensing subjects, computer science and mapping science. The distributions of credits are given in Table 1. The curriculum for the course is given in appendix 1 the description of the subject areas is given in appendix 2.

**Table 1: Subject areas and distribution of credits.**

Subject Areas	No. of Subjects	No. of Credits *	Percentage
Main core	6	24	18.7
Core	15	45	35.2
Mapping Science	2	6	4.7
Computer Science	3	9	7.0
Maths, Physics, Statistics	4	12	9.4
Optional Subjects(3)	3	9	7.0
University subjects	12	23	18.0

Total	45	128	100
*Note :One (1) credit hour equivalent to one (1) hour lecture per week. Three (3) credit hours make up of two (2) hours lecture and two (2) hours laboratory or four (4) hours practical per week.			

### [Appendix 1 B.Sc. \(Remote Sensing\) Curriculum](#)

#### **Appendix 2. Description of Subject Areas**

<p><b>Main Core:</b>  Basics Principles of Remote sensing  Remote sensing Data Processing  Sensor and Remote sensing instrumentation  Field Observations &amp; Data Gathering  Remote sensing Spatial Analysis  Remote sensing Data Analysis</p>
<p><b>Core:</b>  Introduction to Geoinformation System  Introduction to Physical geography &amp; Oceanography  Remote Sensing database  Atmospheric Physics  Technical Writing  Microwave Remote Sensing RS for Earth Resources Management  RS for Environmental Applications  RS Satellite system &amp; Data Transmission  Legal Aspects &amp; Policies of Remote Sensing Undergraduate Project</p>
<p><b>Math's , Physics &amp; Statistics :</b>  Mathematics I  Mathematics II  Physics I  Physics II  Statistics</p>
<p><b>Mapping Science:</b>  Surveying &amp; Mapping I  Surveying &amp; Mapping II  Cartography for Remote Sensing  Photogrammetry and Image Interpretation</p>
<p><b>Computer Science:</b>  Computer Graphics for RS  Computer programming  Database system for Remote Sensing  Remote Sensing File System &amp; Data Structure</p>
<p><b>Optional Subjects:</b>  Minimum of three (3) subjects can be chosen form any inter-department/ faculties subjects.</p>

b. Master and PhD Programme

The Master Programme is offered in 3 ways :

- i. Master through taught course
- ii. Master through taught course and research
- iii. Master research

The total number of credits for the course is 30 with the duration ranging from 1-2 years. The course work requirements for a Master degree in Remote sensing can be satisfied through the following subjects:

- o Basics of Remote sensing
- o Atmosphere Physics
- o Satellite Orbits and Instrumentation
- o Digital Image Processing
- o Ground Observations in Remote sensing
- o Advanced Digital Image Processing
- o Radar Remote sensing

The PhD Programme is a full research programme of 90 credits to be completed in a duration of 3-4 years. Master through research and PhD candidates are encouraged to formulate their own research topics to suit their interest or experience. Below are some past research works completed by postgraduate students and academic staff:

- Bathymetry from clear and turbid waters
- Sea bottom features mapping
- Suspended sediment concentration studies
- Vegetation index mapping
- Sea surface temperature studies
- Heat island mapping
- Sea grass and core reef mapping
- Urban hydrology applications
- Land use studies
- Radar remote sensing for land application
- Topographic mapping from satellite stereo data
- Digital elevation model generation
- Software development

### **Entry Qualifications**

The entrance requirements for the course are as follows:

- a. B.Sc Programme  
Pass the Sijil Pelajaran Malaysia (equivalent to Cambridge O-level exams) with credits in stipulated subjects.
- b. Master Programme  
Possess a relevant bachelor degree recognized by the University

### **Employment Opportunities**

Graduates with the B.Sc degree in remote sensing can seek employment in the public and private sector as managers in remote sensing and GIS projects, System Analyst in image-based Information System, officers in remote sensing and GIS organizations.

Similar, graduates with a Master and PhD degree can also obtain employment in the public and private sectors as researchers or managers in remote sensing and GIS organizations as well as in academic institutions.

### **Laboratory Facilities**

The Centre for Remote Sensing is well equipped to support research and consultation activities. Amongst the facilities available:

- Ten units of PCI EASI/PACE Digital Image Analysis System, connected to LAN
- Ten units of ILWIS Integrated Image Processing and GIS System, connected to LAN
- ERDAS Imaging Integrated Image Processing and GIS System, connected to LAN.
- ERDAS Imaging Integrated Image Processing and GIS System, connected to LAN
- ARC-INFO GIS System, connected to LAN
- Five units of ARCVIEW GIS System, connected to LAN
- Five units of ERMAPPER Digital Image Analysis System, connected to LAN
- Five units of MAPPPINFO Geographic Information System, connected To Lan
- Digital Photogrammetric Workstation DMS
- Mangellan hand-held Global Positioning Systems (GPS)
- Radiometer and integrated sphere for supporting radiometric works.
- Other supporting softwares such as MODTRAN, PcGiant, AutoCAD and QuickSurf.

Other relevant equipment are also available at the Centre for Geographic Information & Analysis, Centre for Hydrographic Studies, Centre for Geodetic & Geodynamic Studies and Photogrammetry & Cartography Laboratories.

### **Summary**

The undergraduate and postgraduate programmes in Remote Sensing at University Technology Malaysia have been described. The course structure, curriculum, Admissions entrance, and employment opportunities for the graduates have also been highlighted in the paper. The first batch of the B>Sc (remote sensing) candidates will be graduating in May 2001