

SPACE EDUCATION IN MALAYSIAN UNIVERSITIES

Mohd Ibrahim Seeni Mohd, Mazlan Hashim and Samsudin Ahmad

Department of Remote Sensing
Faculty of Geoinformation Science and Engineering
Universiti Teknologi Malaysia, 81310 UTM Skudai
<http://www.fksg.utm.my>

1.0 Introduction

In Malaysia there are 17 public universities, 18 private universities and 5 foreign university branch campuses. Space education is mainly being offered by public universities. Space education started with subjects in astronomy and related subjects under various academic programmes in Malaysian public universities such as Universiti Teknologi Malaysia (UTM), Universiti Kebangsaan Malaysia (UKM) in the early 1970's and Universiti Malaya (UM) in mid 1990's. Remote sensing programmes started in mid 1980's and Global Navigation Satellite System (GNSS) and telecommunications in 1990's in UTM. Aerospace engineering programmes were offered in mid 1990's at Universiti Sains Malaysia (USM) and Universiti Teknologi Mara (UiTM). Education in space law has not being given emphasis in local universities, however Universiti Malaya (UM) and UKM have initiated some steps in providing space law through related subjects in their law programmes.

In this paper, space education is presented according to four areas, namely (i) Satellite technology, (ii) Space applications, (iii) Space science, and (iv) Space law. Some of these programmes are offered at undergraduate and postgraduate levels. At undergraduate level, these programmes are offered from 3 – 4 years, while M.Sc. programmes take 1 – 2 years and PhD programmes take 3 – 4 years.

2.0 Education Programmes on Satellite Technology

There is an important need for manpower in the field of satellite technology since the Malaysian government is giving emphasis in space related activities. The universities that offer undergraduate and postgraduate programmes in satellite technology are given below.

a) Universiti Sains Malaysia (USM)

i) B.Aerospace Eng., School of Aerospace Engineering

Subjects include subjects related to aeronautical engineering plus subjects related to space technology and applications, i.e. satellite components, propulsion, flight vehicle/satellite systems and operations.

ii) Postgraduate research on astronautics and satellite technology

Research areas include satellite structural engineering and materials, mission analysis, power system, onboard computer system, remote sensing system payload design and applications payload design, communication payload design, nano/micro satellite design.

b) Universiti Teknologi Malaysia (UTM)

i) Postgraduate research

Research areas include RF communications, radiowave propagation, satellite propagation, satellite TV broadcasting.

c) Universiti Putra Malaysia (UPM)

i) B.Eng.(Aerospace), Faculty of Engineering

Subjects include subjects related to aeronautical engineering plus elective subjects in space technology, i.e. space mechanics, aerospace software engineering, launcher technology, satellite technology, spacecraft dynamics and control, space environment and mission analysis.

ii) Postgraduate research

Research areas (not available)

- d) Universiti Kebangsaan Malaysia (UKM)
 - i) B.Eng.(Electrical, Electronic & System), Faculty of Engineering
Subjects include antenna and radiowave propagation, radio and satellite communications
 - ii) M.Eng.
Subjects include satellite communications.
 - iii) Postgraduate research
Research areas include digital signal processing, image processing, smart & advance antenna, satellite communications.
- e) International Islamic Universiti Malaysia (IIUM)
 - i) B.Eng. (Aerospace), Kuliyyah of Engineering
Subjects: – details not available.
 - ii) Postgraduate research
Research areas include mechanical design and communication payload.
- f) Universiti Malaya (UM)
 - i) Postgraduate research
Research areas include battery development, solar power system, optical communications.
- g) Universiti Teknologi Mara (UiTM)
 - i) Postgraduate research
Research areas include RF communications, radiowave propagation, satellite propagation, satellite TV broadcasting.

For more details on space technology R&D in Malaysia, please refer to Ahmad Sabirin Arshad (2004).

3.0 Education Programmes on Space Applications

There is also an important need for manpower in the field of space applications including remote sensing and GNSS. The universities that are active in space applications activities are given below.

- a) Universiti Teknologi Malaysia (UTM)
 - i) B.Sc.(Remote Sensing), Faculty of Geoinformation Science and Engineering
Subjects include space science, atmospheric physics, remote sensing technology, remote sensing for terrestrial applications, digital image processing, satellite system & data delivery, microwave remote sensing, remote sensing for ocean applications, satellite technology & earth station, remote sensing for atmospheric applications, GPS surveying, policy & legal aspects of remote sensing, environmental impact studies, satellite and sensor design, remote sensing for meteorology applications, remote sensing for hydrology and water resource applications, remote sensing for marine applications, space technology for sustainable development, remote sensing for environmental conservation and disaster management.
 - ii) B.Eng.(Geomatics), Faculty of Geoinformation Science and Engineering
Subjects include principles of remote sensing, astronomy, GNSS.
 - iii) B.Sc. (Geoinformatics), Faculty of Geoinformation Science and Engineering
Subjects include principles of remote sensing.

- iv) B.Urban & Regional Planning, Faculty of Built Environment
Subjects include elective subject on application of remote sensing and GIS methods for local authority.

 - v) M.Sc. Remote Sensing by coursework, Faculty of Geoinformation Science and Engineering
Subjects include principles of remote sensing, digital image processing, microwave remote sensing, atmospheric physics, satellite orbits and instrumentation, GPS surveying, advance digital image processing, applications of remote sensing.

 - vi) Postgraduate research on Remote Sensing
Research areas include atmospheric and radiometric corrections, bathymetry for clear and turbid waters, sea bottom features mapping, suspended sediment concentration, vegetation index mapping, sea surface temperature, coastal erosion mapping, sea grass and coral reef mapping, urban hydrology applications, radar remote sensing for land and sea applications, software development.

 - vii) M.Sc. Satellite Navigation, Faculty of Geoinformation Science and Engineering
Subjects include Navstar GPS, GPS navigation.

 - viii) M.Sc. Satellite Surveying
Subjects include GPS surveying, GPS geodesy, GPS navigation, GPS applications in surveying and GIS.
- b) Universiti Teknologi Mara (UiTM)
- i) B.Surv. Sc. & Geomatics, Faculty of Architecture, Planning and Surveying
Subjects include physical and satellite geodesy, remote sensing, geodetic astronomy.

- ii) Diploma in Geomatics Sc. (GIS), Faculty of Architecture, Planning and Surveying
Subjects include remote sensing, field astronomy.
- c) Universiti Kebangsaan Malaysia (UKM)
 - i) B.Social Sc. (Geography), Faculty of Social Science and Humanities.
Subjects include GIS and remote sensing, atmospheric studies.
 - ii) B.Sc. (Geology), Faculty of Science and Technology
Subjects include introduction to remote sensing and GIS, introduction to environmental remote sensing, integration of remote sensing/GIS/GPS.
 - iii) Postgraduate research (details not available)
- d) Universiti Putra Malaysia (UPM)
 - i) M.Sc. by coursework on Remote sensing and GIS, Faculty of Engineering (details not available)
 - ii) Postgraduate research on Remote sensing and GIS (details not available)
- e) Universiti Malaya (UM)
 - i) B.A. (Geography), Faculty of Arts and Social Science
Subjects include remote sensing and GIS.
 - ii) Postgraduate research on remote sensing and GIS

- f) Universiti Sains Malaysia (USM)
 - i) Postgraduate research on application of remote sensing technology and GIS.

- g) Multimedia University (MMU)
 - i) Postgraduate research emphasizing on microwave sensing technology and applications.

4.0 Education Programmes on Space Science

Education in space science is offered as subjects/topics especially in astronomy, astrophysics and related subjects in undergraduate programmes. Some universities offer space science programmes through research at postgraduate level, i.e. USM, UM, UKM, UTM and UiTM. In USM, the Astronomy and Atmospheric Science Research Unit undertake an integrated research programme in the field of applied astronomy and atmospheric science. In UKM, the Faculty of Science and Technology offers astronomy and astrophysics. In UM, the Faculty of Science also offers astronomy and astrophysics. In UTM, the Almanac Office produces (i) Survey Almanac for land surveying applications, and (ii) “Falak Syarie” Almanac for determining muslim prayer times, starting of fasting month, etc.

For more details on space science activities in Malaysia, please refer to Mohd Zambri (2004).

5.0 Education Programmes on Space Law

Education in space law is not offered as a formal programme by local universities. However, subjects/topics related to space law is provided by universities such as UM and UKM.

6.0 Concluding Remarks

The programmes in space education as offered by the universities in Malaysia are reported. The education programmes in satellite technology and space applications have been given more emphasis by the universities. However, education programmes in space science have been given less emphasis and programmes in space law are lacking.

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