Regional Centre for Space Science and Technology Education in Asia and the Pacific (China)
联合国附属空间科学与技术教育亚太区域中心（中国）

MASTA 2015

Master Program on Space Technology Applications

Remote Sensing and Geo-Information System (RS &GIS)

(For APSCO Member States Only)

Introduction

Space technology and its applications have been made a great advance in recent years, which is considered the one of the most fascinating technical achievements of the human race of the last four decades of the 20th century. The many practical benefits from space technology play a central role for international development efforts.

In order to translate the recommendations of the United Nations Program on Space Applications (UN-PSA) into an operational program, Beihang University has initiated the Master program on Space Technology Applications (MASTA) especially for applicants from Asia-Pacific region since 2006, and program has been held five times successfully till now.

MASTA is an elaborately designed and intensive Master program for students who are interested in exploring the mysterious universe. It focuses on both knowledge acquisition and operational training, and is an application-oriented program. It provides a powerful platform for scholars and professionals to obtain more opportunities for communicating and experiencing the space technology practice in China.

MASTA is designed to give participants a competitive edge by:

- ✧ Broadening their knowledge on space-related issues and activities and encouraging participants to use acquired knowledge and skills through practical, hands-on experience
- ✧ Developing the skills necessary for working effectively with colleagues from a diverse range of disciplines and cultures
- ✧ Placing the participants at the frontier of the industry through contact with space professionals
- ✧ Compiled with international conventions
- ✧ Modularized curricula design
- ✧ Flexible study modes

Introduction to Beihang University

Beihang University (BUAA), formerly known as Beijing University of Aeronautics and Astronautics, was founded in 1952 and is China's first university of aerospace technology. Since the 1950s, BUAA has excelled as one of the 16 key state universities in China. Through more than 50 years of development, BUAA has grown into a science and technology university with aerospace features, combining disciplines in science, engineering, liberal arts, law, economics, management and education. There are currently 24,000 students enrolled in BUAA, including over 10,000 postgraduate students. Doctoral programs are available in 49 fields, master programs in 144 fields and bachelor programs in 48 subjects.

The campus of BUAA is adjacent to the Zhongguancun High-Tech Park of Beijing and is known for its beautiful environment, convenient transportation and various facilities, some of which include an international student dormitory, gymnasiums, swimming pools and other sports facilities. The campus also has a bank, a post office, dining halls, and many other convenient services for the academic and daily lives of international students.

Scholarship and Financial Support

In order to encourage applicants from Member States of Asia-Pacific Space Cooperation Organization (APSCO)，Beihang University and APSCO are jointly recruiting MASTA students on **Remote Sensing and Geo-Information System (RS &GIS)** research direction in 2015. China Scholarship Council (CSC Scholarship)， APSCO, Beijing Municipal Government and Beihang University will provide total **5-6 (five to six) full scholarships** for applicants recommended by APSCO. **The total duration of the study will be 1 year and 9 months**.

The CSC scholarship will cover the following items:

- Tuition fee for 9 months core course study at the University;
- Tuition fee for 1 year advanced research project;
- Free accommodation during study at the University (not including water and electricity costs etc.);
- Living allowance during stay at the University (1700 RMB /per month or according to standard by CSC);
- Insurance fee only for accidents and hospitalization treatments, according to the standard of CSC.
- APSCO will reimburse the international round-trip air ticket costs for one time only.

Application Qualifications

- The age limit of applicants is forty years by the deadline of application, but applicants those are below thirty-five years will be given higher preferences for selections;
- Should have some professional experiences of working in space technology industry or

research institutes;

- ✧ Should have Bachelor Degree of relevant discipline or the diploma equivalent to Bachelor Degree;
- ✧ Should have research background in relevant areas;
- ✧ Should have good command of English and the ability to take courses in English;

Note: *Please notice as a special requirement that selected applicants should come to study at BUAA with their Private Passports only (not official/service/other types of passport).*

Application Procedures and Required Materials

- ✧ Applicants should log onto the website http://laihua.csc.edu.cn and make Registration at first by giving his/her Username, Password, Email etc. Then Username and Password will be sent to them via **e-mail addresses provided**, and after getting it, applicants should fill out the ONLINE Application Form of China Scholarship Council (CSC). And from the system, please get a serial number online and print it out according to requirements, and submit it along with other required materials mentioned below from item No. 1-5. Please notice that a specialty should be chosen as "Space technology Applications", a research direction as "Remote Sensing and Geo-information System (RS&GIS)" and a language of instructions should be chosen as "English". Please also notice that the "Agency No." of Beihang University is 10006.

1. A Health Certificate which bears the seal of clinic or hospital should be completed by a medical doctor after a proper physical examinations. The health certificate is available at http://is.buaa.edu.cn/English/MASTAIndexEng.aspx, and the download link: Foreigner Physical Examination Form.
2. Duplicated copies of a notarized diploma or certificate and notarized school-certificate transcripts of complete academic records.
3. Two letters of recommendation from teachers or experts at or above the level of associate professors in sealed envelopes.
4. 500-word essay about the participant's motivation for applying to MASTA.
5. Checklist for the submitted application documents which includes: i. Duly filled and signed Chinese Government Scholarship (CSC) Application Form, ii. Properly endorsed Health Certificate, iii. Notarized Degree/Diploma certificate, transcripts of completed academic records, iv. Two Letters of Recommendation (in sealed envelop); v. 5oo-words Essay etc.

Note: *All the above mentioned materials should be provided **in English** or **with a translation in English**. In order to speed up your application process, scanned copies can be emailed to the **Contact Person:** jessica@apsco.int so that we can get your information in advance. And **mail all the required documents to the Contact Person at APSCO** by the already set deadline (**March 15, 2015**). APSCO and BUAA will acknowledge the receipt of your application after evaluation. No application documents will be returned after submission.*

Important Dates

- Applicants should mail the required applications documents **to the Contact Person at APSCO** by not later than **March 15, 2015.**
- The results of admission will be notified by **May 10, 2015**.
- The Admission Notice and related documents will be mailed to the successful applicants around **July 10, 2015.**
- The program will begin at the middle of **September 2015.**

Contact Person & Methods

- Ms. Jessica Zhuang, Staff-member, Department of Education and Training and Database Management, Asia-Pacific Space Cooperation Organization (APSCO)
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Remote Sensing and Geo-information System (RS & GIS)

The principle of remote sensing is to obtain information about objects and phenomenon on or around the Earth's surface without having direct contact with them. The best way to implement remote sensing is using remote sensing satellite to organize remote sensing systems. Remote sensing satellites can move in different orbits with various altitudes which can cover huge area or even whole global.

Anything on the Earth's surface would emit or reflect electromagnetic radiation which can be received by sensors inside remote sensing systems. The multi-spectral sensors can record data from all spectral bands (from microwave to ultraviolet) of electromagnetic radiation at once.

Remote sensing systems can be passive or active. Passive systems mean they can either record solar energy that is reflected off the ground targets or emitted by them. Active systems mean they need to send the energy to some ground targets and receive the reflected signals by them. Radar technique is to be used.

The data collected by remote sensing systems must be processed by some special software into useful information which can be understood easily be users. Usually, GIS (Geographic Information System) can be used to form a lot of useful information for civil and military applications.

Under the guidance of the Regulation of Academic Degrees of the People's Republic of China, and other relevant documents issued by Academic Degree Committee of State Department and Ministry of Education, Beihang University initiated the Master program on Space Application for Asia-Pacific applicants in order to satisfy the requirements of the development of the Space Education Center in the Asia-Pacific region and multilateral cooperation education tasks.

With the present activities of UN-PSA around the world, Master programs on Space Application would be completed in a two-stage program:

(a) Core 9-month Course Study

(b) 12 months for Advanced Research project (at Beihang University or in applicant's homeland)

Training Program

Phase Ⅰ **Courses Study in China: 9-month** (Leading to Course Completion Certification of BUAA)					
Module 0	Module Ⅰ	Module II		Module III	
		Module II-1	Module II-2	Module III-1	Module III-2
1 Week	7 Weeks	8 Weeks	5 Weeks	9 Weeks	6 Weeks
Register and Opening Ceremony	Platform Curriculum (Common to 4 Areas)	Fundamental Specialized Curriculum (RS &GIS)	Advanced Specialized Curriculum (RS &GIS)	Team Pilot Project	Personal Advanced Project Proposal for Masters Thesis

Phase Ⅱ **Advanced Research Project in at Beihang University or Participant's Homeland: 12 month** (Leading to Master Degree of Engineering of P.R.China)		
Module IV		
Module IV-1	Module IV-2	Module IV-3
----	>8 Months	>12 Months
Dissertation Preparation	Dissertation Defense	Graduation and Awarding Master Degree

Course Description

Lectures are conducted in English. The thesis for project practice is required to be written in English. Courses are organized into three modularized phase as given below.

The education curriculum of MASTA (Master Program on Space Technology Applications) adopts module pattern. The content of each module is listed as following:

Module 0 is extra-curriculum Academic Elements. It complements the education curriculum to proceed smoothly and effectively.

Module I is 7 weeks and designed as Platform Course. The purpose of this module is to strengthen the participants' fundamental knowledge, help them to study the followed specialty courses smoothly, and know about the new trends of technologies and applications in Space. This Module is compulsory for all the academic areas of MASTA.

Module II is designed as Specialty Curriculum and there are two sub modules. **Module II-**1 is 8-week fundamental specialty curriculum and is designed to give the participants the systematic basic knowledge of RS and GIS through class studying. **Module II-2** is 5-week advanced specialty curriculums and is designed to give the participants the necessary laboratory practice and to introduce the advanced technology and their applications. 3-5 professors or experts are organized into a team to support each CORE course. The lecturers in this module will be not limited in BUAA, a lot of experts and senior engineers come from other institutes or Academies,

such as IRSA, CNSA, AOE, CASC, CAST, NRSC, CMA, CRSSGS, NSMC, etc.

Module III, a pilot project of 15 weeks' duration has two sub modules. **Module III-1** is 9-weeks Team Project. The topics are suggested by BUAA, IRSA and other organizations or institutes. Each participant chooses one of them according to his/her interest or experience. 3-5 persons will be organized into a team. The first objective of this sub module is to encourage the participants to put into practices the knowledge and skills learned in Module I and II. The second objective is to provide a chance to experience decision-making and organization work in sub-teams. The third objective is to finish a comprehensive report of professional quality finished by the whole team and an oral personal presentation. **Module III-2** is 6-weeks Personal Advanced Project Proposal for Masters Thesis, leading towards Phase II. In this sub module, participants will choose one topic, relevant to a specific practical project in space technology after consultation with his/her homeland's organization, supervisor of BUAA / Co-supervisor of his/her homeland. The project of this sub module is to get guidance on the course of action to be pursued at BUAA/home, to get all the necessary experimental data, if required and to get and know how to use the necessary software tools etc.

Educational Measures

(a) Students and supervisors interact to confirm the supervisor and create the education program.

(b) Platform courses are primarily instructed in lectures with self-study as a supplement.

(c) Special courses are instructed as lectures, self-study, and seminars.

(d) Pilot-practice involves ability design and training, also data collecting, processing, judging and managing ground station data.

Testing Method and Requirement

(a) Examination of platform courses and special courses is performed in written form.

(b) For pilot-project, students are required to write special practice reports and thesis topic reports, which should be evaluated by her/his supervisor and the teachers in ground station.

Project Thesis

After completion of the 9 months core-course study at Beihang University, each participant is expected to finish an Advanced Research Project (1 year) for Masters Thesis at Beihang University/in Homeland. Advanced Research Project is the essential part of the graduate student program. The topic of the project is chosen by the participant, in consultation with his/her sponsoring organization and approval by the supervisor. The topic should be relevant to a specific practical project in space technology.

The project thesis should have a topic that uses outer space for peaceful reasons as a precondition. It should also be accomplished to promote the ability of space application and cognition level in her/his home country. The evaluation will be mainly focused on the topic of the thesis, range of the writer's knowledge, value and prospect of the thesis, etc.

Defense and Awarding of Degree

Two experts will be invited to evaluate the thesis. The defense will be organized with the permission of these two experts. The thesis Defense Committee consists of three to five professors in relevant disciplines and is organized by Beihang University.

The supervisor can join the Defense Committee. Thesis defense should be hosted by the chairman of the Defense Committee. After passing the thesis defense and obtaining the verification of the Degree Awarding Committee, the student will be awarded a Master Degree. Those who do not pass the thesis defense can rewrite the thesis and defend again with the approval of Defense Committee within a year.

Academic Facilities

MASTA program students have suitable classrooms. The computer teaching classroom, which includes an extensive range of PCs and multi-media equipments, provides dedicated facilities for participants in learning space science and technology.

Faculty and Academic Staff

The faculty and academic staff for this program consist of professors, experts and senior engineers invited from Beihang University (BUAA) and some institutes or Academies. The core faculty and these experts have long and varied experience in the field of space science and technology. In addition, they have acquired considerable experience over the years and are skilled in teaching and advising international students.

Teaching Methods and Teaching Aids

Modern methods of teaching and instruction will be used for imparting and training during the courses. Printed and digital (CD-ROM) course material of the lectures will be supplied. The teaching methods include class room lectures, video lectures, laboratory and technical visits, field work, group discussion and case studies. Team teaching is the main approach. This process gives participants opportunity to benefit from the experience of more than one lecturer.

Professional Visits and Team Project Base

As part of the course study, some professional visits and TP will be organized in these institutes and organizations:

- Institute of Remote Sensing Applications (IRSA), Chinese Academy of Sciences
- Academy of Opto-Electronics (AOE), Chinese Academy of Sciences
- Institute of Atmospheric Physics, Chinese Academy of Sciences (IAP)
- China Meteorological Administration (CMA)
- National Satellite Meteorological Center (NSMC)
- China Remote Sensing Satellite Ground Station（CRSSGS）
- The National Remote Sensing Center of China（NRSCC）
- China Center for Resource Satellite Data and Applications (CRESDA)
- Chinese Academy of Aerospace Technology (CAST)

- China Aerospace Science and Technology Corporation (CASC)
- China Aerospace Science and Industry Corporation (CASIC)
- China Space Operations Centre
- China Astronaut Centre
- National Aerospace Information Centre of China, etc.

9-Monthes Curriculum of RS & GIS

Module 0: Extra-Curriculum Academic Elements (1 Week)

No.	Item	Type
EC1	Training Program Interpretation	Orientation course or information will be arranged in the 1st WK.
EC2	Meeting with the Course Studying Director	
EC3	Preparing Teaching Material	
EC4	Seminars	
EC5	Professional Visits	
EC6	Culture Visits	
EC7	Series Lectures Ⅰ: Communications Skills	
EC8	Series Lectures Ⅱ: Advanced Space Research and Technology Development in China	
EC9	Extracurricular Laboratory Practices	
EC10	Extracurricular Teaching Assist	
EC11	Scientific Literature Reading	
EC12	Course Progressing Evaluation	
EC13	Scholarship Qualification Re-evaluation on New Participant	
EC14	Excellent Course Studying Scholarship Evaluation	

MⅠ: Platform Curriculum (2 Months)

MⅠ-1: Mathematics for Space Science and Engineering

Code	Title	Class Hrs	Credits	Type
PC1-1	Probability and Statistics	42	3	Select one of them.
PC1-2	Theory of Matrix	48	3	
PC1-3	Fractals and Wavelets	48	3	

MⅠ-2: Computer

Code	Title	Class Hrs	Credits	Type
PC2-1	Computer Laboratory (1): Matlab Programming	32	3	Select one of them.
PC2-2	Computer Laboratory (2): C and C++ Programming	48	3	

MⅠ-3: Space Views

Code	Title	Class Hrs	Credits	Type
PC3-1	Introduction to Satellite System Platform	24	1	Core
PC3-2	Over View of Space and Earth Environments and	24	1	Core

	Advanced Space Technologies			
PC3-3	Overview of the Issues Related to Space	18	1	General

MⅠ-4: Chinese Culture

Code	Title	Class Hrs	Credits	Type
PC4-1	Introduction to China and Chinese Language	54	3	Compulsory

Module Ⅱ: Specialty Curriculum (4 Months)

Module Ⅱ-1 Fundamental Specialty Curriculum (8 weeks)

Code	Title	Class Hrs	Credits	Type
MC1-1	Remote Sensing Image Processing and Interpretation	48	3	Compulsory
MC1-2	Geographic Information System: Theory and Methods	36	3	Compulsory
MC1-3	Physical Principles of Remote Sensing	48	3	Compulsory
MC1-4	Introduction to Photogrammetry	18	1	Compulsory
MC1-5	Cartography & Geomatics	18	1	Compulsory

MⅡ-2 Advanced Specialty Curriculum (6 weeks)

Code	Title	Class Hrs	Credits	Type
MC1-6	Software Applications of RS	18	1	Compulsory
MC1-7	Software Applications of GIS	18	1	Compulsory
MC1-8	Case Studies in the Applications of RS & GIS	30	1	Compulsory
MC1-9	GIS Spatial Database	24	1	Elective

Module Ⅲ: Pilot Project (3 months)

Module Ⅲ-1: Team Project

Code	Title	Class Hrs	Credits	Type
TP1-1	Team Pilot Project (1)	9 Wks.	8	Select one of them.
TP1-2	Team Pilot Project (2)	9 Wks.	8	

MⅢ-2: Personal Pilot Project

Code	Title	Class Hrs	Credits	Type
PP	Pilot Project		3	
	● Project planning			
	● Pre-field interpretation and analysis			
	● Data collection			
	● Data analysis			
PP	Advanced Research Project Proposal/Master's Degree Thesis Proposal		1	