

# MASTA 2014

## Master Program on Space Technology Applications

### Global Navigation Satellite Systems (GNSS)

(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 (Master Program on Space Technology Applications) 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

## Brief 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 the Member States of Asia-Pacific Space Cooperation Organization (APSCO), Beihang University and APSCO are jointly recruiting MASTA students on **Global Navigation Satellite Systems (GNSS)** research direction in **2014**. China Scholarship Council (CSC Scholarship) will provide total **6 (Six) full scholarships** for applicants recommended by APSCO. **The total duration of study will be 1 year and 9 months.**

### The 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 **for the student only** during study at the University (facilities are not including water and electricity, etc. costs.);
- ✧ Living allowance during stay at the University (1700 RMB /per month or according to standard by CSC);
- ✧ **Insurance facilities according to the standards offered by CSC.**
- ✧ APSCO will reimburse an 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)**. An **automatically generated serial number** will found at the completed application form and then make the print out of the application form from the system. Then **add your photograph** at the proper place of the application and put your **signature and date correctly** and then submit the application form it along with other required supporting documents mentioned below in the **item No. 1-6**. When you fill out the form, please notice that a specialty should be chosen as **“Space technology Applications”**, a research direction as **“Global Navigation Satellite System (GNSS)”** and a language of instructions should be chosen as **“English”**. Please also notice that the **“Agency No.” of Beihang University is 10006**. **Please note: No application form will be accepted without the automatically generated serial number on it and duly signed.**

1. **A Health Certificate, which bears seal/stamp of clinic or hospital**, should be completed by a medical doctor after proper physical examinations. The Health Certificate is available at [http:// http://is.buaa.edu.cn/English/DownloadEng.aspx](http://is.buaa.edu.cn/English/DownloadEng.aspx), and download link: **Foreigner Physical Examination Form**.
2. Notarized copies of **‘O’ and ‘A’ Level or equivalent certificates** and **Bachelor Degree certificates or Diploma** must be submitted in English language; if it is other than English language then it must me translated in English language and certified by competent authority.
3. Notarized copies of the **Transcript of Academic Records for ‘O’ and ‘A’ Level or equivalent and Bachelor Degree** must be submitted in English language; if it is other than English language then it must me translated in English language and certified by competent authority.
4. **Two letters of recommendation** from professors or experts at or above the level of associate professors in sealed envelopes.
5. At least **500-words length essay** about the participant’s motivation for applying to MASTA
6. **Checklist table in A4 size paper** 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 **‘O’ and ‘A’ Level or equivalent certificates** and **Bachelor Degree certificate or Diploma**, iv. Notarized Transcript of Academic Records for **‘O’ and ‘A’ Level or equivalent** and Bachelor Degree, v. Two Letters of Recommendation (in sealed envelop); vi. 500-words Essay.

Note: *Application will not be taken under consideration if any one of the above documents is missing. In order to speed up your application process, scanned copies can be emailed to the **Contact Person: [salam@apsco.int](mailto:salam@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 (**15 March, 2014**). 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 **15 March, 2014**.
- ✧ The results of admission will be notified by **10 May, 2014**.
- ✧ The Admission Notice and related documents will be mailed to the successful applicants around **10 July, 2014**.
- ✧ The program will begin at the middle of **September 2014**.

## **Contact Person & Methods**

- ✧ Md. Abdus Salam, Deputy Director General, Department of Education and Training and Database Management, Asia-Pacific Space Cooperation Organization (APSCO)
- ✧ Mailing Address: Building 13 & 14, Section 3, No. 188, South West Fourth Ring, Fengtai District, Beijing 100070, China.
- ✧ Phone: 86-10-6370 2677 Ext: 402
- ✧ Fax: 86-10-6370 2286
- ✧ E-mail: [salam@apsco.int](mailto:salam@apsco.int)
- ✧ Website: <http://www.apsco.int>

Global Navigation Satellite System (GNSS) provides positioning, navigation and timing services for the whole world. It is the most important spatial infrastructure in the social life and military applications in modern times. The GNSS would serve people in many areas together with Remote Sensing, Geographical Information System such as disaster management, emergency response, land, aviation and maritime transportation etc.

The objective of the program is to promote students master the space segment for the GNSS, that is the satellite constellation, orbit and the payload for clock, signal source, communication and attitude control etc. To promote students master the ground segment for the satellite maintenance, telemetry, ephemeris and almanac, and even the user segment for the applications. To promote students master the frontier technologies on GNSS

## 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 (GNSS)	Advanced Specialized Curriculum (GNSS)	Team Pilot Project	Personal Advanced Project Proposal for Master's 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 GNSS 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.

**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, 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 object 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 Master's 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 Master's 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.

### 9-month Course Study Schedule (GNSS)

No.	Item	Class Hrs	Credits	Remark
<b>Module I Platform Courses</b>				
PC1-1	Probability and Statistics A	48	3	Select at least 3 credits of them
PC1-2	Probability and Statistics in Engineering B	32	2	
PC1-3	Wavelets Analysis and its Applications A	48	3	
PC1-4	Wavelets Analysis and its Applications B	16	1	
PC1-5	Theory of Matrix	48	3	Optional
PC1-6	Numerical Analysis	48	3	Optional
PC2-1	Computer Laboratory (1): Matlab Programming	32	2	Compulsory
PC2-2	Computer Laboratory (2): C and C++Programme	48	3	Optional
PC3-1	Space Environment, Orbit and Spacecraft Systems	48	3	Compulsory
PC3-2	Introduction to Space Law	18	1	Optional
PC3-3	Space Technology and Space Economy	18	1	Optional
PC4-1	Introduction to China and Chinese Language	54	3	Compulsory
<b>Module II Major Basic Courses &amp; Major Courses</b>				
MC3-1	GNSS Reference System	18	1	Compulsory
MC3-2	Principle of Global Navigation Satellite Systems	32	2	Compulsory
MC3-3	GNSS Navigation Signals	18	1	Compulsory
MC3-4	GNSS Receiver Principles and Design	32	2	Compulsory
MC3-5	GNSS/INS Integration Navigation	32	2	Compulsory
MC3-6	Global Satellite Navigation System Applications	18	1	Compulsory
MC3-7	Satellite Navigation Data Processing	32	2	Compulsory
MC3-8	GNSS Experiment	18	1	Compulsory
MC3-9	GNSS New Technologies	18	1	Compulsory
<b>Module III Team Pilot Projects</b>				
PP	Team Pilot Project	12 Weeks	8	Select one of them