



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 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 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 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, etc. costs.);
- ✧ 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 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). 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 **“Global Navigation Satellite System (GNSS)”** and 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 seal/stamp of clinic or hospital, should be completed by a medical doctor after proper physical examinations. The Health Certificate is available at <http://is.buaa.edu.cn/English/MASTAIndexEng.aspx>, and 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 envelope); v. 500-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 Jie, Staff-member, 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: 405
- ◇ Fax: 86-10-6370 2286
- ◇ E-mail: jessica@apsco.int
- ◇ Website: <http://www.apsco.int>



Global Navigation Satellite Systems (GNSS)

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

| No. | Item | Class Hrs | Credits | Remark |
|--|--|-----------|---------|-----------------------------------|
| Module I Platform Courses | | | | |
| 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 |
| Module II Major Basic Courses & Major Courses | | | | |
| 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 |
| Module III Team Pilot Projects | | | | |
| PP | Team Pilot Project | 12 Weeks | 8 | Select one of them |