Grand Challenges Scholars Program at Beihang University

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About BUAA

Beihang University (BUAA) was founded in 1952 with the merger of the aeronautical departments from eight top Chinese universities. Today it is one of the nation’s foremost research universities supported by China’s Project 211, Project 985 and Project 2011. BUAA has an enrollment of more than 29,951 students, attending 28 schools in two campuses in Beijing and many going on exchange in partner universities across Europe, Asia, the Americas and Oceania. Among the first Chinese universities to offer postgraduate programs in English for international students, Beihang annually attracts over 1,700 foreign students from 90 countries. The faculty totals over 2,300 members whose research and teaching encompasses sciences, engineering, economics, management, humanities, law, philosophy, education, medicine and art. A strong body of 20 accomplished professors have been inducted as members of the Chinese Academy of Sciences and the Chinese Academy of Engineering.

Beihang offers 189 academic programs, including 61 undergraduate programs and 128 postgraduate programs. The university has been reputed for its competitive edge in such disciplines as aeronautics and astronautics, instrument science and technology, computer science and technology, management science and engineering, etc.
Beihang University took part in the “Global Grand Challenges Summit----Engineers for the future” from July 18 to 20, 2017
应对工学重大挑战及重大挑战学者计划

The Grand Challenges for Engineering and The Grand Challenges Scholars Program (GCSP)
20th Century’s Greatest Engineering Achievements

A CENTURY OF INNOVATION
Twenty Engineering Achievements That Transformed Our Lives
21世纪工学又会取得什么样的成就？

难以预测，但是我们可以尝试回答：

21世纪工学需要达到什么样的愿景？

愿景: 延续地球上的生命，使我们的世界更加可持续、安全、健康和快乐。
Continuation of life on the planet, making our world more sustainable, safe, healthy, and joyful.

The Vision for the 21st century is about People and the Planet

Maslow’s Hierarchy of Needs
NAE提出的工学重大挑战

可持续发展
Sustainability
- 能源
- 环境
- 全球变暖

安全
Security
降低对人类和自然威胁的脆弱性

健康
Health
改善医学和医疗保健

快乐生活
Joy of Living
扩展和增强人类能力
Preparation of GCSP proposal

- GCSP vision
  - Existing and planned activities
  - Program administration
  - Program funding source

- GCSP scholar selection and support
  - Estimate number of participating students
  - Select faculty mentors
  - Assist students to complete the program requirements

- Execution and completion of the five competencies

- Assessment and tracking of scholars
**Vision:** Provide BUAA students with an internationally recognized learning experience in addressing engineering global grand challenges

**Goals:** The following table shows the alignment that exists between the goals of the BUAA- SGE and the goals of the GCSP:

<table>
<thead>
<tr>
<th>BUAA-SGE/GCSP goals</th>
<th>International</th>
<th>Interdisciplinary (industry/university; teaching/learning)</th>
<th>Innovation</th>
<th>Leadership</th>
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</thead>
<tbody>
<tr>
<td>Research/Creative Project Experience</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Multidisciplinary Curriculum</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Business/Entrepreneurship</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Global Dimension</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<td>Service Learning</td>
<td>X</td>
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Beihang University organized the “NAE-GCSP” Workshop from October 16 to 18, 2017.
Workshop leader: Dr. Bindiganavalel Ramakrishn
GCSP at BUAA

- Viable Business/Entrepreneurship:
  - course about Innovation and Entrepreneurship
  - Beihang SGE Engineering Leadership courses
  - Internship and a BUAA business plan competition

- Research/Creativity Experience:
  - 2 semester research project

- Multidisciplinarity:
  - GCSP Introductory workshop
  - At least 1 elective course aligned with the chosen GC theme

- Global Dimension:
  - Exchange program overseas
  - An approved overseas competition
  - International Summer School in a foreign university or BUAA

- Social Services:
  - the GC Outreach Program to middle and high schools
  - GCSP student club

11
14 GCSP topics

1. Make solar energy economical
2. Provide energy from fusion
3. Develop carbon sequestration methods
4. Manage the nitrogen cycle
5. Provide access to clean water
6. Advance health informatics
7. Engineer better medicines
8. Reverse-engineer the brain
9. Prevent nuclear terror
10. Secure cyberspace
11. Restore and improve urban infrastructure
12. Enhance virtual reality
13. Advance personalized learning
14. Engineer the tools of scientific discovery
Who can apply?

(1) All students in the SGE are candidates to participate in the BUAA GCSP. Students from other BUAA Schools can apply if they are approved by the dean of the students’ school and meantime the dean of SGE, and, if they comply with the following requirements: minimum of 3.2 GPA and a minimum of B+ in English courses.
(2) Preferably Year 1 and Year 2 students
Education Component:

The General Education block of Beihang University SGE program is proposing to include the following courses:

a. Engineering Leadership series of courses (4 credits)
b. GCSP introductory workshop (required, no credit)
c. GCSP course in one of the GC theme to be selected from a series of Beihang University course – see Appendix 3 in our GCSP proposal
d. Introduction to General Engineering (4 credits)
e. Engineering Ethics (2 credits)
Assessment

(1) The GC Scholars are to commit themselves to one more of the Grand Challenges and focus on those challenges throughout their program. The selection criteria for scholar applicants will be according to the demonstrated passions for one or more Grand Challenges in the application, and the overall performance of the applicants during the GCSP Steering Committee interview. A score will be given to each applicant by the GCSP committee members during the interview, and the selection will be according to the score level.

(2) GC Scholars will be comprehensively evaluated by the GCSP Steering Committee in their third and fourth year at BUAA based on their overall performances in the five major components. A module of the evaluation form is attached as Appendix 5. The Scholars will be required to give a presentation to the GCSP Steering Committee, indicating their completion of the five components and how the Grand Challenge(s) they chose are addressed. The GCSP Certificate will be issued to the qualified Scholars in the graduation ceremony.

(3) Final Score of Assessment based on:

- Completeness of the portfolio
- Commitment to the program
- Creativity of the portfolio
- Integration of the chosen grand challenge in fulfilling the program competencies
Resources, Challenges & solutions

Resources of Fund

BUAA has managed to secure the resources needed to launch and maintain the GCSP through the resources received to establish the new School of General Engineering. The resources include: support from University for Student Innovation and Practice Education Fund (5 million Yuan), Innovation Fund (1.0 million Yuan), and BUAA International Talents Fund (10 million Yuan).

Tight timeline for Year 2 students
- Prepare a well-structured curriculum plan
- Closely monitor students’ progress and suggest alternatives if possible

Uncertainty in securing internship/exchange affects the success rate of GCSP
- Students are advised to complete an overseas activity at an earlier stage of their study, preferably in year 2 or 3.
- Integration with existing systems to enhance the success rate of GCSP
Integration with existing systems in SGE

Based on Aerospace Engineering (AE), Mechanical Engineering (ME) and Electronic Information Engineering (EIE), the School of General Engineering (SGE) aims to cultivate International General Engineers (IGE) with International, Interdisciplinary, Innovative, Integrated and Leadership (I4L) capabilities, which are needed to tackle complex problems in a fast-changing world, and to contribute to the innovative engineering education of Beihang University and China. There have been also some aligned programs of GCSP, such as “Fengru Cup” and “Challenge Cup”, which with a various of evaluation systems to stimulate the design thinking and innovation capability of the students.

Collaboration with the Leadership Program of the SGE

- Priority given to GCSP students to participate in existing “Fengru” Cup and Challenge Cup Extracurriculum S&T Contest.
- Priority given to GCSP students to participate in selection interviews of the Overseas Internship Scheme.
Acknowledgements

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Thanks!

Q&A