Career Support Activities for Mathematical Students through Academic-Industrial Collaboration

Oct. 28, 2017
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1. Survey of course flow after graduations in Japan
2. Trend of kinds of jobs for mathematical students
3. Establishment of career support office
4. Requirements for mathematical students
5. Career support and education activities
6. Summary and remaining issues
1. Survey of Course Flow after Graduations in Japan

- **Approx. 560-thousand graduate students**
  - **University (undergraduate school)**
  - **Graduate School (Master course)**
    - 12%
    - Drop out/Unknown
  - **Graduate School (Doctor course)**
    - 10%
    - Drop out/Unknown
  - **Approx. 14-thousand doctor-degree holders**
    - Doctor-degree holders
      - Academic faculty member: approx. 2,400 *17%
      - Academic postdoctoral researcher: approx. 1,400 *10%
      - Industrial company: approx. 5,000* *36%
    - Industry companies and governments, etc.

Source: FY 2017 School Basic Investigation Report, Ministry of Education, Culture, Sports, Science and Technology
1. Survey of Course Flow after Graduations in Japan

Case of graduate school of mathematical sciences for the University of Tokyo

Doctor-degree holders at FY 2017: N = 30

- Industrial company: 13%
- Academic faculty member: 17%
- Academic postdoctoral researcher: 60%
- Unknown: 10%

Case of graduate school of mathematical sciences in Japan

Doctor-degree holders at FY 2014: N = 140

- Industrial company: 57%
- Academic faculty member: 19%
- Academic postdoctoral researcher: 5%
- Public enterprise: 9%
- Otherwise: 10%

Number of mathematical doctor-degree holders to join industrial companies is very low.
2. Trend of kinds of jobs for mathematical students

One decade ago
- Teacher, lecturer, professor
- Scientist/Engineer
- Actuary
- Information/electronic
- Insurance/bank/securities

Advances of ICT
- Consulting/system integration
- Data scientist
- Information/electronic/manufacturing etc.
- Scientist/Engineer
- Actuary/quants
- Education
- Teacher, lecturer, professor

Current ICT: Information and Communication Technologies
- Teacher, lecturer, professor
- Scientist/Engineer
3. Establishment of Career Support Office

- Career support office was established at Dec. 2014 in Faculty of Mathematical Sciences

- Members
  • Head: Prof. Yamamoto
  • Adviser: Takashi Ikegawa

- Main missions
  • Coach for planning career vision and/or for hunting jobs toward industrial companies,
  • Support for education through academic-industrial collaboration such as long-term internship and project/problem based learnings.
4. Requirements for mathematical students

Transferable skills

- Programming skill (e.g., Python, C languages)
- Lack skills for mathematical students

Mathematical skill

Skills that can be used in any jobs, e.g., team work, leadership, and verbal/written communication abilities.
5. Examples career support and education activities

- long-term Internship
  - 新日鐵住金株式会社
  - NIPPON STEEL & SUMITOMO METAL
  - pwc
  - YAHOO! JAPAN
  - NTT
  - LATTICE TECHNOLOGY
  - Murakumo
  - Morpho
  - ARTE
  - Research & Development
  - etc.

- Project/problem based learning
  - Study group: one-week collaboration activity
    - 新日鐵住金株式会社
    - NIPPON STEEL & SUMITOMO METAL
    - muRata
    - kao
    - Towa
    - 筑波大学
    - University of Tsukuba
    - etc.
  - Practical seminar: one-year collaboration activity
    - 新日鐵住金株式会社
    - NIPPON STEEL & SUMITOMO METAL
    - Nikon
    - JAXA
    - ABbeam Consulting®
    - NISSAN
    - etc.
6. Summary and remaining issues

We showed that
(1) from survey, the number of mathematical doctor-degree holders to join industrial companies is very low,
(2) however, the kinds of jobs which require mathematical skills have been significantly spread with advances of ICT,
(3) transferable skills are required to work in industrial companies, and
(4) education and career support activities through academic-industrial collaboration to improve the transferable skills, such as long-term internship and project/problem based learnings, are performed.

Remaining issues include
evaluation of effect of our activities.

ICT: Information and Communication Technologies