Case Study: 
Postgraduate Education in Tianjin University

Prof., Dr. GONG Ke
Tianjin University is one of the main research universities in China with 26,000 students and 2000 faculty. Its distinguished strength is in engineering education and research.
• Founded in 1895

Tianjin (Peiyang) University has introduced the modern Higher Education System into China.
• Graduate Education since 1930s

However, large scale graduate education had been carried out after establishing the Graduate School in 1984.
• TU has conferred master and doctor degree to about 30,000 graduates, many of them are playing important roles in different areas.
ZHOU Kai, Chief designer for 2008 Olympic Park (1988, Master)
ZHAO Xiaojun, Chief Architect for “Water Cubic” (1989, Master)
Dr. XU Jianyun, CEO of Beijing Construction Co.,
Chief master builder for major 2008 Olympic buildings (1989, Doctor)
MA Xingrui, CEO of China Space Science and Technology Co., Chief engineer of Chinese Manned Space Project. (1985, Master)
Dr. ZHANG Guanjun, VP of Beihang University, distinguish Professor for precision measurement and instrumentation. (1991, Doctor)
TAN Xuguang, CEO of Weichai Diesel Power Co., the largest Diesel engine Company in China (2002, Master)
LIU liming, VP of China Ocean Oil Corporation (CNOOC) (2004, Doctor)
LIU Dashan, VP of China National Machinery Corporation (SinoMach) (1989, Master)
WEI Jiafu, CEO of China Ocean Shipping Company (2002, Doctor)
Without the support from Chinese Higher Education including graduate education, China’s development in past 30 years would be *IMPOSSIBLE*. 
Now there are 14,043 postgraduates study in TU, among them 5,637 for Master (2-3 years), 2,660 for Doctor (3-5 years) and 5,746 for other professional degrees.

Annual enrolment:
- Master: 2700
- Doctor: 750
- Professional
From University’s (graduate school) point of view, the core issue is to establish and improve a comprehensive system ensuring the quality of graduate education.
Guided by the academic degree committee, the graduate school is to

- Select
- Support
- Cooperate
- Inspect
- Assist
• Based on strict national examination, the enrolment ratio is about 1:4
• Recently, more attentions are paid to comprehensive oral exam for motivation, attitude, ……
• Not every faculty is qualified for supervise graduate students
• About 500 professors are selected as doctoral supervisor, according their academic performance in recent years
• Qualification of graduate supervision is made every 3 years
• The selection for research topic has been defended and proven.
• By selecting topics it is encouraged to catch the front-edge of the scientific advancement and/or to meet the key demands for social / economic developments.
• E.g. Dr. ZHU had selected the topic for high precision real time measurement on automobile production line, he has invented a technique using calibrated visual process, which is now widely applied in many vehicle companies including Toyota and Citroen.
Dr. HU had worked on femto-second laser pulses in photonic crystal fibers. Focusing on nonlinear effects of the fiber, HU has made in depth theoretical study and made an ultra-fast laser pulses generator, which are highly assessed worldwide.
Key elements of quality assurance

- Select
- Support
- Cooperate
- Inspect
- Assist
• Compulsory courses with emphasis on scientific fundamentals is required. (at least 10 credits, like *Functional Analysis*)

• The courses are divided into degree and non-degree ones to cover a rather wide scope for students to elect.
<table>
<thead>
<tr>
<th>课程类别</th>
<th>课程编号</th>
<th>课程名称</th>
<th>学时</th>
<th>学分</th>
<th>备 注</th>
</tr>
</thead>
<tbody>
<tr>
<td>学位课</td>
<td>B131G001</td>
<td>现代科技革命与马克思主义</td>
<td>50</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>第一外国语</td>
<td>90</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B131R001</td>
<td>非线性数学（上）</td>
<td>32</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B131R003</td>
<td>应用随机过程</td>
<td>30</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B204G501</td>
<td>通信系统模型与业务模型</td>
<td>20</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B204G502</td>
<td>现代信息论</td>
<td>40</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>必修环节</td>
<td>B204R001</td>
<td>学术报告</td>
<td>2.0</td>
<td></td>
<td>4次</td>
</tr>
<tr>
<td>选修课</td>
<td>B204E501</td>
<td>LATEX排版软件</td>
<td>40</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B204E502</td>
<td>高等计算机网络</td>
<td>40</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B204E503</td>
<td>高速光器件物理</td>
<td>40</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B204G102</td>
<td>小波分析及其信号处理应用</td>
<td>60</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B204E702</td>
<td>光纤通信网络技术</td>
<td>40</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B131E001</td>
<td>现代物理学与高新技术</td>
<td>40</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S131GA03</td>
<td>工程与科学计算</td>
<td>32</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

不低于4学分
<table>
<thead>
<tr>
<th>课程编号</th>
<th>课程名称</th>
<th>学分</th>
<th>学时</th>
</tr>
</thead>
<tbody>
<tr>
<td>B131R001</td>
<td>非线性数学（上）</td>
<td>1.5</td>
<td>32</td>
</tr>
<tr>
<td>B131R002</td>
<td>非线性数学（下）</td>
<td>1.5</td>
<td>32</td>
</tr>
<tr>
<td>B131R003</td>
<td>应用随机过程</td>
<td>1.5</td>
<td>30</td>
</tr>
<tr>
<td>B131R004</td>
<td>小波分析</td>
<td>3.0</td>
<td>60</td>
</tr>
<tr>
<td>B131R005</td>
<td>科学计算选讲</td>
<td>3.0</td>
<td>60</td>
</tr>
<tr>
<td>B131R006</td>
<td>锥优化与鲁棒优化</td>
<td>3.0</td>
<td>60</td>
</tr>
<tr>
<td>B131R007</td>
<td>实用多元统计分析</td>
<td>3.0</td>
<td>60</td>
</tr>
<tr>
<td>S131GA01</td>
<td>应用泛函分析</td>
<td>2.0</td>
<td>40</td>
</tr>
<tr>
<td>S131GA02</td>
<td>矩阵论</td>
<td>2.0</td>
<td>32</td>
</tr>
<tr>
<td>S131GA03</td>
<td>工程与科学计算</td>
<td>2.0</td>
<td>32</td>
</tr>
<tr>
<td>S131GA04</td>
<td>随机过程基础</td>
<td>2.0</td>
<td>32</td>
</tr>
<tr>
<td>S131GA05</td>
<td>数理方程</td>
<td>2.0</td>
<td>32</td>
</tr>
<tr>
<td>S131GA06</td>
<td>应用统计学</td>
<td>2.0</td>
<td>32</td>
</tr>
<tr>
<td>S131GA07</td>
<td>最优化方法</td>
<td>2.0</td>
<td>32</td>
</tr>
</tbody>
</table>
• To ensure the course quality, training for teachers are continuously carried out.
• More lectures are provided to introduce the nearest developments in relevant areas all over the world.
A good research platform means outstanding academic disciplines with:

- Faculty
- Facilities
- Scholarship
- Experiences
- Etc.
Disciplines in TU

Disciplines assessed: 24

Top 10:
1. Chemical Engineering
2. Measurement & Instrumentation
3. Optical Engineering
5. Dynamics & Mechanics
6. Electrical Engineering
7. Civil Engineering
8. Industrial Management
9. Environmental engineering
10. Biomedical engineering

TJU Performance in the National Assessment 2007-2009
• Funds are mainly from research projects, but also from the Graduate School.

• Funds are not only support to the research, but also to students life, according to their performance.
Key elements of quality assurance

- Select
- Support
- Cooperate
- Inspect
- Assist
An important characteristic of TU is its cooperation with industry by means of:

- Joint laboratories
- Joint Supervisions
  - For every candidates of M.Eng.
- Joint R&D
  - Hundreds contracts per year (>€30mil.)
Last year, to celebrate the 10 years anniversary of Master of Engineering in China, there are 150 M. Eng. Are rewarded nationally for their outstanding contributions, among them there are 9 graduated from TU.
• Very important but very difficult:
  – Persistent efforts are made with Nankai University to develop “Green chemistry and chemical Engineering”
  – Cooperation between biomedical engineering and the hospital studies are highlighted
  – Some cross-campus projects are organized
International collaborations are strongly promoted in recent years by

- Students/faculty visiting (>700 in 2008)
- Joint master program
  - Osaka, Montreal, UW, Bochum, Magdeburg, Rostock, …
- Joint labs/centers/projects
  - Caterpillar, Honeywell, IBM, Micronas, Siemens, MIT, UC Berkeley, TUA&M,
- Invited lectures
• Especially, supported by Chinese government, 100 selected students are sent to study oversees.
Key elements of quality assurance

- Select
- Support
- Cooperate
- Inspect
- Assist
• Peer reviewed publications are required not only as a practice of research but also as peer assessment

• Anonymous reviews have been widely used

• Defense examiners have include a number of professors out of TU
• Rigorous regulations are made to maintain scientific ethic.
• In last year, there’re 2 master and 1 doctor degree had been cancelled for dishonesty in relevant research.
• A course for SCIENTIFIC ETHIC will be introduced as compulsory one.
Key elements of quality assurance

- Select
- Support
- Cooperate
- Inspect
- Assist
• It is encouraged to have more social experiences through student’s societies and their organized activities like students forum, contest, etc. on economics, sports, arts, politics, etc.
Key elements of quality assurance

- Select
- Support
- Cooperate
- Inspect
- Assist
• In the historical wave of globalization, how can we carry out the graduate studies in a more “globalized” way?
Thanks!

March 2009, Berlin