

支撑材料（六）、国内外专家意见

《大学物理》课程巡视

反馈报告

2015 年 12 月 14-16 日，应北京理工大学教务处之托，来自卓越大学联盟高校中的哈尔滨工业大学、大连理工大学、天津大学、重庆大学、西北工业大学、北京理工大学的六位巡视教师对于北京理工大学的《大学物理》课程教学全过程进行了巡视。巡视组成员现场听了七位老师的《大学物理》授课；参观了物理教学实验中心，与实验管理教师进行了详细交流；分两个组与学习大学物理课程的学生进行了座谈；听取了课程负责人对于北京理工大学《大学物理》教学团队教学、课程建设、教研、青年教师培养等的详细介绍；详细讨论了《大学物理Ⅱ》课程期末考题的出题思路，并给出了方案；详细审阅了北京理工大学《大学物理》课程的教学档案。

以下对巡视情况进行具体汇报。

1. 课程听课

巡视组成员到现场听课 12 人次，在听课前后与任课教师进行了简单交流，巡视组成员之间也对听课情况进行了广泛交流。

巡视组成员共同的感受是，任课教师教学态度认真、内容熟悉、十分投入，亦十分热爱教学，注重教学的科学性与逻辑性。突出之处表现在：

（1）教学中物理思想、物理图像突出，定性解释与定量分析相结合有助于学生对于物理内容的深入理解。

（2）以比较契合的、简明的例题引导学生对教学内容的理解，便于加深学生对所学内容的掌握。

（3）教师能够有效地调动学生的学习兴趣，课堂上有师生间自然的互动，课堂教学氛围融洽。

（4）在全英文授课中，对于重点、难点部分适当进行中文的说明，避免了学生的学习吃“夹生饭”。

（5）教师对于教学过程有所设计，对课堂掌控自如。巡视组成员所听课程皆为 PPT 教学，我们认为还应该适当配合板书，使得教学更灵活一些，充分发挥传统教学的优越性。巡视组成员感觉到个别青年教师科研功底深厚，习惯于科研报告，但是教学

有别于科研报告,还应该在教学过程、教学细节的处理上向有经验的教师多学习,个别教师的教学节奏要相对更合理一些。

2.学生座谈

巡视组成员分为两组与近 30 位学生进行了座谈,北京理工大学的学生礼貌谦逊,与巡视组成员进行了广泛交流,他们普遍反映《大学物理》课程教师教学认真负责,教师水平高,关心学生。同时还反映出一些细节问题——

(1) 关于教学过程中使用 ppt 的问题,学生表示进入大学学习以后,已经习惯了 ppt 教学的方式,但依然希望在采用 ppt 教学的过程中加入公式推导过程等的板书演示。建议考虑学生的这一愿望,丰富教学手段。

(2) 学生表示在学习过程中,如果听明白了就不看书、直接做题,如果不明白再看课程 ppt。建议教师引导学生在平时学习过程中,更多的研读教材以及其它参考书,以便对于相关知识有更深入的理解,而不仅仅停留在完成相应的作业上。同时,教师也可以给学生介绍更多的参考资料。

(3) 学生表示很欢迎在物理课堂上有更多的演示实验,直接演示物理现象,可以提升学习兴趣。建议学校充分考虑学生的这一需求。

(4) 学生认为物理考试过程中需要记忆的公式较多。国内外的一些高校在物理考试过程中已给出相关公式,我们认为可以参考类似的做法。

3.教师座谈

巡视组听取了北京理工大学《大学物理》课程组对于教学团队建设情况的报告,并与任课教师就教学、课程建设、师资队伍建设等进行了广泛交流。具体交流如下几个方面:

(1) 课程负责人介绍了本校大学物理课程的历史沿革、特色、教材、课程建设情况、今后课程的发展方向。

(2) 巡视组成员和理工大学的教师在一起交流、讨论了各校的大学物理教学情况。包括学时、师资、教学内容、教材编写等。还交流了学生在学习大学物理方面的情况。

(3) 交流过程中大家一致认为要加强演示实验,加强课程资源建设与投入。

4.教学档案

巡视组成员查阅了北京理工大学《大学物理》的教学文档,感觉如下:

- (1) 教学文件齐全、规范。
- (2) 实行了考教分离，有严格的命题、审题、阅卷、复核程序，考试管理规范、有效。
- (3) 有详细的考后分析，对后期教学有较高的参考价值。

巡视结论：

- (1) 北京理工大学的《大学物理》课程教学水平高，受到学生的普遍认可，有一支结构合理、能力较强的教师队伍。
- (2) 大学物理教师倾心于教学，非常投入，勇于进取，在双语教学、Mooc教学、视频公开课等方面进行了探索与实践，为其他高校提供了宝贵的经验。
- (3) 教学文档齐全、管理规范。
- (4) 建议学校制定更有针对性的政策，进一步引导和促进教师特别是青年教师在教学上的投入；建议学校加大课程建设的投入，在教学方面进一步加强对外交流。

Report: Evaluation of the college-physics and international-physics programs at BIT (2019)

Preamble

During a two-week site visit, Profs. Joe Sanderson and Jeff Chen (University of Waterloo, Canada) evaluated various aspects of the college-physics and international-physics programs at BIT. They both endorse the high teaching quality of these programs and believe that these programs can be favorably compared with best physics programs internationally.

1. Classroom and lab instructions

Both evaluators have had an opportunity to review course outlines and recent exams and to visit classrooms and talk to instructors, and students. Observed classes included eight college physics, and one international program class instructed in English and three labs, all carried out in English.

a. Quality of Instructors.

The teachers were all well prepared; The instructors all exhibited a strong background in the material; They used diverse teaching methodologies showing effective engagement; All of the lectures were well planned; Classes used up to date examples such as gravitational waves (this was a pleasant surprise for the evaluators) every day and practical examples, and examples coupled to applications in engineering.

b. Instruction and presentation:

All topics are well communicated and well laid out, the classes are all coordinated with a well-defined overall plan and a library of presentation material which individual instructors have customised to their own style. Both qualitative and quantitative analysis combined to help students understand the physical concepts.

c. Student participation:

There was creative and good use of experimental demonstrations, involving student participation. Availability of partially completed notes in some cases, helps to promote active in class participation.

d. Teaching methods:

There were a wide variety of methods used to give the students an active learning opportunity, such as classroom response examples (using rain classroom), frequent traditional style mini dialogues (with good response level). In the lab the introductory section was typically a presentation followed by a hands on demonstration.

2. Teaching Material and Equipment

a. Text book:

The in house produced four volume text book, for college physics prepared by the team led Prof Hu with chapters written by instructors, who have shown excellence in the topic. The volumes are based on feedback from students from previous generation of texts, and are designed to incorporate new developments in information technology. This is clear from the prevalence of QR codes on many pages linking to the online MOOC, (licenced videos including high quality international productions) and The text follows the guidelines of the Chinese ministry of education, in terms of physics content for a science and technology university (2010). The writing style is focused on the physical picture, with thorough explanations of physics ideas as well as presenting practical applications. The text book is very well received by students and closely followed in class.

b. Online elements:

Online elements, for the college physics course includes, the MOOC which has been recognised as among the top MOOCS in the country and as described above includes high quality videos, online tests, discussion forum. Student participation in the forum is encouraged by the possibility of a participation grade, and facilitated by graduate student TAs. A separate course management system allows instructors to share material, in class note templates or post class summaries for example. Participation for the online tests is also provided by a grade and multiple attempts are encouraged.

c. Labs:

The space and in house equipment is first rate and other resources are available. The progression of the labs is independent of the in-class material, which seems to be in line with research findings which show little linkage is needed. The in-house lab manual was prepared bilingually, based on past experience. The lab equipment is extremely well maintained by technicians and staff. A faculty instructor is present for every lab and classrooms are limited to around thirty students each working on their own apparatus, independently, although clearly discussion is encouraged. Each lab is started with a lecture on the purpose, principles and apparatus used in the experiment, lasting around thirty minutes, students appear to pay close attention to this. The lab marking is organized, with a clear marking scheme and students appeared to have no problem finishing on time.

d. Course outlines and final exams:

The Course outlines were extensive and detailed giving students a clear idea of the program of study. Review of the final examinations for college physics and the international program, showed clear alignment between the course outlines and final exams and with textbook assignments. The evaluators noted that the college physics course was set independently of the instructors, to give an unbiased final exam and eliminate “teaching to the test”.

3. Meeting with instructors, administrators and students

The reviewers had a scheduled meeting with the administration of the school of physics, an open discussion with teaching faculty, and informal discussion with students.

- The college has approximately 70 teaching faculty, who are specialized in theoretical physics, condensed matter physics, optics, plasma, and computational physics. These backgrounds cover the needed knowledge base to support the college physics teaching.
- There is a combination of student evaluation and instructor-peer evaluation of teaching faculty members. This seems to place a good balance on innovative, evidence based teaching and student satisfaction.
- The school administration recognises the value of excellent teaching by annual teaching award and nominating for university level teaching award. An research intensive faculty member has a teaching load of 96 hours per year and a teaching intensive faculty member has a double teaching load; there is an excellent division of tasks, that allows the faculty to make substantial contribution to teaching.
- The university established the outcome-based education plan, which covers the Engineering schools and the college physics teaching for these programs. The university and school of physics actively support this plan.
- The faculty recognizes the need to adapt to the new culture of the new-generation, incoming students. The younger faculty members are particularly in tune with the internet-age students.
- A representative of the office of undergraduate academic affairs, described the range of funding available to promote teaching activities including teaching based research activities and Prof Hu described a research activity to assess a flipped classroom implementation which showed very promising results, which have recently been presented at a conference
- The faculty development centre representative, described the year long teaching training program for new faculty and their active program of meetings, focusing on specific teaching

challenges, Encouragement to attend a yearly teaching and learning conference in Beijing was also discussed.

4. Comparison with University Waterloo

- The two universities have similar natures: they are both science and engineering heavy universities and the Physics School of BIT (or Department of Physics at Waterloo) is required to cover service teaching for approximately 3000 students (1000 at Waterloo).
- The class size varies at both universities, with a range of 50~120 students in a typical session. This is towards the higher side of student/professor ratio.
- Both universities provide adequate teaching assistance resource, at approximately same level per student per course.
- The material in the standard college-physics textbooks at the two universities are at a similar level and with a similar depth. However, in the actual course delivery in classroom, we feel that Waterloo courses go into as much depth as BIT courses would do.
- Both Universities have a similar teaching philosophy in covering service teaching: well-structured plans, coordinated teaching material, defined marking scheme. BIT's experience in setting the final examine independent of the actual instructors seems to be a good teaching/learning quality measure that could be adopted by Waterloo.
- Both Departments value detailed course outlines. The course element assessment
- The presence of an active university unit dedicated to improving faculty instruction is a similarity between the two universities, and the possibility of funding to undertake evidence based teaching development is also a positive similarity.
- A meeting with chair physics UW and associate dean BIT which decided that the first year course content for physics majors was transferable, which is an indication of matching standards between the two universities.

Summary:

The college-physics and international physics programs at BIT are first-rate programs in China and are, in many aspects, comparable to the Physics service-teaching activities in Waterloo.

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