HERIOT-WATT UNIVERSITY

REPORT OF THE ACADEMIC REVIEW TEAM

ACADEMIC REVIEW OF: PHYSICS

DATE: 11th & 12th November 2015

LOCATION: David Brewster Room 3.15

1. INTRODUCTION

An Academic Review of the Physics discipline took place on 11th & 12th November 2015 by a team comprising:

**Review Team:**
- Prof Lynne Jack, School of Energy, Geoscience, Infrastructure and Society (Chair)
- Dr Derek Jamieson, School of Life Sciences
- Dr Kenny Weir, Imperial College London
- Dr Gordon Robb, University of Strathclyde
- Ms Emmerentian (Emma) Mbabazi, (PGR), School of Energy, Geoscience, Infrastructure and Society
- Mr Simone Rea (UG), School of Mathematical and Computer Sciences

**Advisors/Observers:**
- Ms Helen Crosby, Quality Assurance Manager
- Mrs Dawn Skidmore, Accreditation Manager
- Prof John Sawkins, Deputy Principal (Learning and Teaching)
- Dr Ian Glen, Quality Enhancement Officer (meeting 8)
- Denise McCaig, Heriot-Watt University Students Union

2. REVIEW TEAM JUDGEMENT

Upon conclusion of the review, the Team reached the following judgements:

2.1. The Review Team confirmed that the review objectives were being met and that the Discipline's programmes were re-approved for on-going delivery.

2.2. The Review Team confirmed that the Discipline Team has in place effective and robust arrangements for securing and managing: academic standards; programme quality; the quality and enhancement of the student learning experience. These arrangements are likely to continue to be effective in the future.

2.3. The Review Team confirmed that the Discipline Team has in place effective arrangements to manage the operation and enhancement of the Discipline's programmes, in line with the School's strategic objectives, which are being implemented at the programme level.
3. **GOOD PRACTICE AND POSITIVE FEEDBACK**

3.1. The students’ view of staff was that they are both accessible and supportive.

3.2. Undergraduate students confirmed that they feel well-prepared for assessment, and noted that this is due, in part, to the use of mid-semester tests.

3.3. Undergraduate students felt that feedback on their work was timely and gave them an opportunity to submit additional work for comment by staff prior to the exam diet.

3.4. The undergraduate students spoke positively about induction, and it was clear that there had been a notable improvement in student induction over recent years.

3.5. The Review Team supports the introduction of a School Induction Committee and the proposed changes to induction processes.

3.6. The undergraduate students were positive about the mentoring scheme and were strongly supportive of the way in which this embeds, in years 1 and 2, tutorial groups.

3.7. The Review Team noted the positive staff view on the transparency of the Physics teaching allocation.

3.8. The Review Team noted that new staff are offered good support that recognises and reflects their needs.

3.9. Recent changes to the EngD and MSc were well-received by students, who were also very positive about induction, delivery of taught courses and the clarity on arrangements with University of St Andrews.

3.10. Postgraduate research students noted a good level of contact with their Primary Supervisor.

3.11. The Review Team noted that the opportunities made available to postgraduate research students for lab demonstrating was good, and that this was supported by an appropriate level of academic development.

3.12. Postgraduate Research Students noted that their student representation system works well.

3.13. Postgraduate Research Students spoke positively about the mentoring scheme used in IB3, and the Review Team were supportive of the proposed roll-out of this scheme to the other Research Institutes.

3.14. The Review Team noted the significant improvement of completion rates for PGR students.

4. **FORMAL RECOMMENDATIONS FOR ACTION**

4.1. The Discipline team should review the delivery of split courses to ensure a smooth transition between the teaching styles of the two halves.

4.2. The Discipline team should implement an appropriate support and induction process for year 2 direct-entry students for both pre and post registration.

4.3. The Discipline team should address inconsistencies in the PGR induction processes.

4.4. The Discipline team should address the poor undergraduate progression rates; particularly for later years.

4.5. The School should confirm implementation of the proposed PGR funding scheme for travel, and should ensure clear communication on this to both students and staff.
4.6. The Discipline team should address the issue of closing the feedback loop with students i.e. the team should implement the University’s Student Survey Management process. Reference should be made to the Learning and Teaching briefing paper 16 a).

4.7. The School should review the purpose of the Learning and Teaching Agreement, and confirm clarity on implementation, if appropriate, for both staff and students.

4.8. The Discipline team should review the use of VISION to ensure the consistency of implementation of (at least) minimum criteria.

5. UNIVERSITY RECOMMENDATIONS FOR ACTION

5.1. Concerns relating to student survey response rates should be brought to the attention of the Chair of the Student Survey Management Group.

6. OTHER RECOMMENDATIONS FOR CONSIDERATION

6.1. The School should address staff and student concerns about the lack of consistency of PhD scholarship awards with regard to the period of study, travel funding and stipends.

6.2. The Discipline Team should review staff CPD opportunities with regard to raising awareness and knowledge of these amongst all staff.

6.3. The Discipline Team should review the effectiveness of the Class Representative and School Officer system with regard to raising awareness within the Discipline.

6.4. The Discipline Team should consider supplementing its existing annual review process for PhD students to include additional “light touch” reviews at mid-year points.

7. REVIEW TEAM’S COMMENTARY

7.1. Student learning experience

7.1.1. Programme choice and student induction

i. General induction – PGR/PGT/EngD/UG
Undergraduate, PGT and EngD students noted their satisfaction with the induction they received. Undergraduate students in particular commented on the improvement of the induction process through the years. PGR students’ induction, on the other hand, was noted as inconsistent. For students that started their PhDs out-with the scheduled inductions run by the University and the Scottish Universities Physics Alliance (SUPA) the induction seemed to be dependent on the supervisor. This led to a lack of clarity on the academic and support systems that were available to them.

ii. Direct entry students – preparation; support
The review team noted that while students were generally very positive about the induction system and its improvements over the past few years, some of the students highlighted the lack of support for year 2 direct entrants. Prior to registration to year 2, a very brief summary of the topics covered in year 1 was available online. The review team believes that a list of courses with related description, syllabi and learning outcomes would allow more students to make a more informed decision about direct entry into year 2 (which appeared to be amongst the Discipline team aims).

iii. Course selection - UG
A number of undergraduate students seemed unsure of the options available to them to progress to the MPhys, although other students were clearer. More broadly though, students seemed unaware of the threshold or criteria for progression. When the issue of progression rates in later years of the programme was discussed with
staff, they were aware of some of the factors that might affect these rates but recognised that further understanding is required. The Review Team advised that the teaching team reflect on both communication to students and on better understanding why some students exit earlier than anticipated.

iv. **Teaching and Learning Agreements (TLA)**

The significance afforded to the Teaching and Learning Agreement (TLA) in the Review documentation was found to be far higher than its significance as perceived by students and staff.

The role of the TLA should be clarified and communicated clearly to students and staff. If the TLA is to be considered as a formal agreement between students and staff then its signature should form part of the induction process for undergraduate students.

**7.1.2. Student Mentoring, Supervision and Support**

i. **Mentoring (UG & PGR) Tutorials**

All students (undergraduate, postgraduate, PGR and EngD) were hugely positive about the support they receive from staff. They commented specifically on the open-door policy and on the dedication and knowledge of all staff. The mentoring and tutorial systems for undergraduate students were also very well received, and students specifically noted that they were keen to retain the current structure for these. PGR students also found their supervisors accessible and supportive, with some saying that they see their supervisor daily. Others for whom contact is less frequent were not concerned by this, and noted that they were aware of mechanisms through which to voice concerns should they arise.

ii. **Communication - UG (progression)**

On the whole, students were positive about communication and felt that even if they were unsure of something, there was ready access to staff that are always willing to help. However, as noted in 7.1.4 (i) below, some students were unsure of the reasons they might select either the BSc or MPhys option and of the assessment/threshold criteria for the MPhys transfer.

iii. **Supervision Arrangements**

It is recommended that consideration be given to introducing additional “light touch” reviews for PhD students at mid-year points, e.g. 6, 18, 30 months, with minimal workload for students and supervisors. This would potentially have benefits as early warnings of problems and as a method for assisting high completion rates.

**7.1.3. Assessment and Progress Review**

All students were aware of and spoke very positively about the clarity of the assessment methods for their courses. The undergraduate students in particular noted that details of mid-semester assessment and examination formats are generally explained both in the introductory lecture and a few days before the actual mid-semester assessment. Overall, students felt that they were always well informed and prepared for their tests.

For courses in year 4 and 5 which are 100% examined, students reported that the opportunity to submit weekly tutorial problems and past exam questions for marking is a very good alternative to mid-semester assessments as a way of getting feedback on their progress. Students were happy with the mid-term assessments as a good indicator of how they were getting on in the course and were satisfied with the feedback received, particularly with that on the laboratory sessions.

The frequency of monitoring and reporting progression of PGR students ranges from quarterly for EngD students to annually for PhD students. It was reported that more frequent monitoring and reporting for EngD students is necessary due to the dual academic/industrial nature of the EngD program. It is recommended that consideration should also be given to increasing the frequency of monitoring and reporting progress for PhD students.
EngD and PGR students were satisfied with their periodic reviews and were clear on what they needed to produce leading up to these, and how each review would be conducted. EngD students particularly noted the quarterly reviews as a good method for monitoring progress.

7.1.4. Progression and Retention and Completion rates

i. **UG - Strategy for addressing issues**
Data presented on progression rates for undergraduate students on both the BSc and MPhys degrees are perhaps lower than might be expected. Given the difficulty in identifying the ‘true’ progression rate in years 1 and 2, the attention of the Review Team focused more on Years 3-4 and 4-5. Discussions with students revealed that although most were aware of the options open to them, and the dual transfer route between the BSc and MPhys, some were unsure of the reasons they might select either option and of the assessment/threshold criteria for the MPhys transfer. When the issue was raised with staff, there did not appear to be a coherent plan or active current discussion as to how this issue should be addressed, other than an apparent preference, on students’ behalf, for the MPhys pathway. The Review Team were hopeful that progression rates might be able to be improved through better communication with students and through the development of an academic enhancement plan.

ii. **PGR & EngD – Completion rates**
The meetings with the PhD and EngD students were very positive. In recent years the School, and the Physics Discipline in particular, has gone to great lengths to increase the rates of completion. Largely this was achieved by the PGR student co-ordinator personally contacting all the students in their third year and beyond to encourage writing up and submission. Staff reported that this approach seemed to have been successful.

7.1.5. Student Representation and Feedback Opportunities

i. **Representation process**
The review team noted an inconsistency in the awareness of the undergraduate student representative system. Some students were not sure about the role of their class representatives and school officer, while others were not aware of who their representatives were. The review team was of the view that the good relationship and regular meetings between mentors and mentees allow student's issues to be readily addressed. The Discipline team should review and evaluate the effectiveness of the class representation system.

Postgraduate students spoke very positively of their representation system and highlighted its effectiveness in resolving any issues that arise.

ii. **Feedback opportunities (including surveys)**
Students are encouraged to participate in NSS and PTES. Recent NSS results for Physics have been improving.

Opportunities for UG students to provide feedback to staff and the Discipline ranged from informal discussions with staff, representation through the year representatives and the Staff Student Liaison Committee. The University procedure for gathering end of semester student feedback via VISION elicits a very poor return and it is difficult for staff to gain useful information from such a low rate of response. Students commented that they felt this mechanism of collecting feedback was impersonal, they had limited understanding of how the data was used and they had no indication of any actions taken in response to comments made. Staff were critical of this mechanism noting that the timing of the survey (at the end of the semester) meant that any feedback could not be acted upon for the current cohort of students. The low rate of return is in contrast to when the subject Discipline ran its own paper collection
of student feedback. Those surveys were carried out mid-term so feedback could be acted upon.

It is a requirement that feedback, however limited, is responded to and it is a formal recommendation that the discipline team close the feedback loop (4.6). In addition the lack of engagement with the University survey process should be considered by the University (5.1).

7.1.6. Learning and Teaching

i. **Allocation of teaching and research (inc. School Workload Model)**

   The process of allocating teaching and administration duties and the balance between teaching, administration and research is perceived by staff to be fair and reasonable. The transparency of the process, e.g. visibility of teaching and administration duties for other staff, is more apparent to established staff than to recently appointed staff. The implementation of a workload model as part of the preparation for Athena-Swan accreditation was recognised as an enhancement which should ensure transparency.

   Recently appointed staff and those on research fellowships carry a lighter teaching load.

ii. **Quality of Teaching; Teaching arrangements incl. MSc and SUPA**

   Students expressed a high degree of satisfaction overall with the taught component of postgraduate courses. The MSc programme being delivered together with St Andrews is now well established and the joint delivery appears to work well.

   Similarly EngD students expressed approval of the taught component of the EngD programme, both in its timing, now concentrated at the beginning of the EngD, and its content.

   PhD students also expressed general satisfaction with taught courses, and all were aware of the formal requirements from both the University and SUPA. There were some negative experiences of SUPA courses which had a large number of lecturers and where there were problems with video conferenced lectures, due to operation of the technical equipment.

iii. **Split courses (transition between topics)**

   All the students were very positive about the mid-semester tests and the valuable feedback that they receive on their performance. However, a significant number commented that they frequently experienced problems with the transition to the second part of the course. On questioning, the problems were not a reflection of the subject area or indeed of the individual lecturer, merely that it took time to adjust to a different style of delivery. Students commented that by the time they got used to the delivery style of the first lecturer they had to then adjust to the second lecturer. It is recommended that the Discipline team considers ways to try and militate against this, possibly involving greater interaction between both lecturers on a course, to ensure a smooth hand-over and minimise disruption to students. Peer observation of lectures may also help in this regard.

iv. **VISION**

   The Reflective Analysis document made note that Physics was working towards an enhanced minimum presence on VISION. Students could see the value of VISION as a first stop for information and past examination papers. However, students’ comments suggest that there is a lot to be done to enhance the provision which varies considerably depending on the academic staff.

   The staff that the review panel met with outlined the type of material that was expected to be provided through VISION but discussions with students suggested that it is not being implemented across the Discipline.
It is a formal recommendation that the Discipline Team review this situation to ensure the consistency of the implementation of the minimum provision (4.8).

v. **Journal access – PhD**

PGR students reported that they were unable to access journals that they considered necessary for their field of study, particularly the “Nature” journal which they could not access electronically.

7.1.7. **Employability / Future / Development**

i. **Conference attendance**

Staff and students agreed that there was a need to provide a fund for conference attendance for all students during the course of their PhD study. PGR students understood that a nominal £1,500 fund for the duration of the program was now in place for each student to fund attendance at conferences. Staff on the other hand viewed this as a proposal yet to be agreed. It is recommended that clarification should be provided.

ii. **Tutoring/ Lab demonstration/(Learning Enhancement and Development Skills (LEADS))**

The postgraduate research students reported that they are encouraged to engage in laboratory demonstration activities. Students spoke favourably about the level of expectation, noting that these opportunities also nested well within their PhD study, and provided a welcome opportunity for career development. The Review Team noted that all students had completed the LEADS programme in support of these laboratory activities.

7.2. **Academic standards and quality**

7.2.1. **Assessment**

All of the appropriate steps and robust procedures are in place for the preparation, review and approval of examination papers. A template provides a common format for examination papers which is used by the person preparing the examination. The paper is then reviewed by the writing team and an examination paper editor for each year. For examination papers in the qualifying year there is a further round table review of the papers before they are presented to the External Examiners. The responses from the External Examiners are reviewed and if appropriate their comments are incorporated. The response to all External Examiners’ comments are recorded and fed back to the External.

All examination papers are second marked.

All staff showed excellent understanding of these processes.

7.2.2. **New Staff Induction, Probation, Training**

The 'new staff' were very positive about their experiences to date, and were enthusiastic about the opportunities that lie ahead for them, and the level of support offered by the Discipline. The staff commented, however, that they did not find the University induction particularly useful; especially as for some, the timing did not coincide with commencement of their employment at Heriot-Watt. For most though, the School and/or Institute induction had helped a lot. The staff were also aware of, and welcomed, the new induction processes being introduced by the School, in part, in response to the Athena Swan initiative. Probationary arrangements for staff seemed to have been organised well, with the academic mentoring scheme operating effectively. Some staff commented however, on the lack of communication with regard to probationary arrangements.

Staff also commented on the way in which their teaching had been allocated, and although the process seems rather informal, all ‘new staff’ felt that the discussions were both transparent and constructive. They were positive too about the support for their research through provision of funding for the appointment of a postgraduate research student.
Support for the use of VISION was seen to be incremental, and to an extent, self-informed, but the group did not deem this problematic. None of the new staff are registered on the University’s PGCAP programme, as this has now been removed as a formal requirement of probation although some reported having completed elements of the programme relevant to their personal needs.

7.3. Quality Enhancement

i. School Strategy and Enhancement Plan
The Director of Learning and Teaching (DLT) described that the School is organised into five research institutes with the majority of physics staff belonging to the Institute of Photonics and Quantum Sciences (IPaQS) with a smaller number in IB3. The school also has five teaching disciplines, one of which is physics.

The School delivered a presentation on their Strategy and Enhancement Plan and the key points are set out below:-

- development of undergraduate and postgraduate teaching programmes in line with the University’s Learning and Teaching strategy
- internationalisation of programmes, also in line with the University’s Learning and Teaching strategy
- enhancement of the student learning experience
- enhancement of student learning spaces within the School
- outreach activities
- improvements in the quality of student intake
- improved links with industry

The presentation described the key statistics of the students studying physics; principally the physics UG cohort is largely Scottish with around 16 to 18% RUK students, there being very few overseas students. The DLT commented that the physics group has worked hard recently to help increase UG student progression and to identify ‘at risk’ students. They have instigated weekly tutorial meetings between students and their mentors with a view to increased student contact with their mentors enabling problems to be identified early. The DLT also mentioned the recently introduced Learning and Teaching agreement describing what students can expect from staff and what staff expect from students.

The School led an Enhancement Workshop entitled ‘What can we do differently in Physics’ and involved staff, students and the Review Team addressing 4 general themes:-

- How can we improve attendance?
- How can we increase the interaction between L&T and Research
- Are there better ways to deliver courses to enhance learning?
- Are there personal or technical skills that we should be aiming to further develop in our students?

Through a series of group discussions one activity was identified under each theme. These activities were further discussed and a single poster summarising each activity prepared. The Discipline Team will review these activities with the aim of identifying aspects which could be implemented to provide enhancement.

ii. VISION
This has already been commented on in Section 7.1.6 (iv) and is revisited here under quality enhancement. A consistent minimum presence on VISION (formal recommendation 4.8) would provide enhancement. In addition, comments from some staff indicate that there are some ideas in the early stage of consideration on making more use of the facilities available within VISION and providing further enhancement.
7.3.1. **Staff Development**

The staff team including early-career and more experienced staff were generally unaware of opportunities for career development and for CPD. However, there was some awareness of the courses run by the Centre for Academic Leadership and Organisational Development. There was also some discussion of a colloquium series, and a VISION workshop delivered by the Library, but knowledge of this, and other opportunities, seemed limited, hence the recommendation for consideration noted in section 6.2.