
# University College Dublin

## Periodic Quality Review

## UCD School of Physics

## April 2010

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## 1. Introduction and Overview of UCD School of Physics

### *Introduction*

1.1 This report presents the findings of a quality review of the UCD School of Physics, at University College Dublin. The review was undertaken in April 2010. The UCD School of Physics response to the Review Group Report is attached at Appendix 1.

### *The Review Process*

1.2 Irish Universities have collectively agreed a framework for their quality review and quality improvement systems, which is consistent with both the legislative requirements of the Universities Act 1997, and international good practice. Quality reviews are carried out in academic, administrative and support service units.

1.3 The purpose of periodic review is to assist the University to assure itself of the quality of each of its constituent units, and to utilise learning from this essentially developmental process in order to effect improvement, including :

- To monitor the quality of the student experience, and of teaching and learning opportunities
- To monitor research activity, including: management of research activity; assessing the research performance with regard to: research productivity, research income, and recruiting and supporting doctoral students.
- To provide an opportunity for units to test the effectiveness of their systems and procedures for monitoring and enhancing quality and standards
- To provide a framework within which the unit can continue to work in the future towards quality improvement
- To identify shortfalls in resources and provide an externally validated case for change and/or increased resources
- To identify, encourage and disseminate good practice – to identify challenges and address these
- To provide public information on the University's capacity to assure the quality and standards of its awards. The University's implementation of its quality review procedures also enables it to demonstrate how it discharges its responsibilities for assuring the quality and standards of its awards, as required by the Universities Act 1997.

1.4 Typically, the review model comprises of four major elements:

- Preparation of a Self-assessment Report (SAR)
- A visit by a Review Group (RG) that includes UCD staff and external experts, both national and international. The site visit normally will take place over a two or three day period.

- Preparation of a Review Group Report that is made public

- Agreement of an Action Plan for Improvement (Quality Improvement Plan) based on the RG Report's recommendations; the University will also monitor progress against the Improvement Plan

Full details of the review process can be found on the UCD Quality Office website: www.ucd.ie/quality.

1.5 The composition of the Review Group for the UCD School of Physics was as follows:

- Professor Mark Crowe, UCD School of Agriculture, Food Science and Veterinary Medicine (Chair)

- Professor Maeve Cooke, Head, UCD School of Philosophy (Deputy Chair)

- Dr David Timoney, Dean of Engineering

- Professor Dr T. Maurice Rice, ETH Zürich

- Professor Sune Svanberg, Lund University

1.6 The Review Group visited the School from 27th – 30th April 2010 and had meetings with School staff, University students and staff, including: the Head of School; College Principal; SAR Co-ordinating Committee; School academic staff; Science programme Dean; School support staff; employers of graduates; postgraduate students, taught and research; recent graduates; undergraduate students; UCD Library. The site visit schedule is included as Appendix 2.

1.7 In addition to the Self-assessment Report, the Review Group considered documentation provided by the Unit and the University. This included undergraduate external examiner reports, lists of PhD STA seminars and invited seminars.

***Preparation of the Self-assessment Report***

1.8 The School set up a Self-assessment Co-ordinating Committee in accordance with the UCD Quality Office Guidelines.

The members of the Co-ordinating Committee were:

- Chair & Head of School: Prof. Lorraine Hanlon

- Acting Chair (July-December 2009): Prof. Padraig Dunne

- Deputy Chair & Director of Graduate Studies, College of Engineering, Mathematics & Physical Sciences: Prof. Padraig Dunne

- Head of Subject: Prof. Gerry O'Sullivan

- Head of Teaching & Learning & Senior Lecturer: Dr. Emma Sokell

- Graduate Studies Director & Associate Professor: Prof. Peter Duffy
- Lecturer: Dr. James Rice
- Office Manager: Ms. Marian Hanson
- Chief Technical Officer: Mr. David Cooney
- Senior Technical Officer: Mr. Thomas O'Reilly
- Postgraduate Student Representative: Daniel O'Brien

1.9 The UCD School of Physics Self-assessment Report Preparation Timeline (summarised):

- 1st July 2009: Co-ordinating Committee established
- 1st December 2009: Kick-off meeting of the Co-ordinating Committee
- 08th February 2010: Chair meets with UCD Quality Office team
- 10th February 2010: Staff and post-docs on-line survey posted
- 20th February 2010: Undergraduate focus group with postgraduate committee member
- 21st February 2010: Postgraduate focus group with postgraduate committee member
- 24th February 2010: Co-ordinating Committee SWOT session with external facilitator
- 05th March 2010: SAR Co-ordinating Committee meeting
- 12th March 2010: SAR Co-ordinating Committee meeting
- 14th March 2010: Draft SAR circulated to all staff for comment
- 19th March 2010: School meeting for all staff to discuss and provide input to the SAR
- 23rd March 2010: Stage 1 & 2 physics student focus group with external facilitator
- 25th March 2010: SAR Co-ordinating Committee meeting
- 29th March 2010: Final Self-assessment Report Submitted to the UCD Quality Office

### *The University*

1.10 University College Dublin (UCD) is a large and diverse university whose origin dates back to 1854. The University is situated on a large, modern campus, about 4km to the south of the centre of Dublin.

1.11 The UCD Strategic Plan to 2014, which had just been launched at the time of the site visit, states that the University's Mission is:

> 'to advance knowledge, to pursue truth and to foster learning, in an atmosphere of discovery, creativity and innovation, drawing out the best in each student and contributing to the social, cultural and economic life of Ireland in the wider world.'

The University is currently organised into 35 Schools in five Colleges;

- UCD College of Arts and Celtic Studies
- UCD College of Human Sciences
- UCD College of Life Sciences
- UCD College of Engineering, Mathematical and Physical Sciences
- UCD College of Business and Law

1.12 As one of the largest universities on the island of Ireland, UCD supports a broad, deep and rich academic community in Science, Engineering, Medicine, Veterinary, Arts, Celtic Studies and Human Sciences. There are currently more than 24,000 students (15,400 undergraduates, 6,900 postgraduates and 1,900 Occasional and Adult Education students) registered on University programmes, including over 4,600 international students from more than 120 countries.

### *UCD School of Physics*

1.13 The vision of the UCD School of Physics is to become the leading physics School nationally and a significant one internationally. The School commits itself to be a place where students have their educational needs met and staff can develop productive and rewarding careers in teaching and research. The School's mission is to:

- pursue frontier physics research, driven by fundamental issues facing science and society;
- grow research capability through the recruitment of world-class physicists and establish critical mass top-quality research teams through technology transfer and the expansion of the funding base;
- broaden the range of degree programmes and improve the learning environment to attract and retain increased numbers of quality students;
- be active proponents of physics and its importance to society.

1.14 The School of Physics is one of seven Schools within the College of Engineering, Mathematical and Physical Sciences (EMPS). The other Schools are Architecture, Landscape & Civil Engineering (ALCE); Chemical & Bioprocess Engineering (CBE); Computer Science & Informatics (CSI); Electrical, Electronic & Mechanical Engineering (EEME); Geological Sciences and Mathematical Sciences.

1.15 In the last five years the School has come through a period of unprecedented change, in part due to the University-wide restructuring that saw the department of Experimental Physics joined by three members of the department of Mathematical Physics to form the School of Physics.

1.16 All of the academic staff are research active, in line with UCD's mission to become a European Top 30 research-intensive university. There has been a large increase in research funding applied for and won over the last five years, as well as an increase in research output and quality. The number of PhD students has doubled in the last 3 years in line with the School's strategic plans.

1.17 The School obtains funding from Science Foundation Ireland (SFI), Enterprise Ireland (EI), the Irish Research Council for Science Engineering & Technology (IRCSET), St. Luke's Institute for Cancer Research, the EU Framework 7 programme (FP7), the European Space Agency (ESA) and from industrial sources, including Intel Ireland, Sematech and Intel Components Research, among others.

1.18 In 2008 a new taught graduate MSc programme in NanoBio Science was introduced and a denominated undergraduate BSc programme in Physics with Astronomy & Space Science was introduced in 2006.

1.19 The School has a reputation for producing high-quality graduates and researchers, as witnessed by their acceptance to international doctoral programmes, their recruitment to postdoctoral/tenure track positions at internationally eminent institutions (e.g. Max Planck Institutes, ETH Zurich, Columbia University, ESA) and their successful national and international careers (e.g. in Medical Physics) for which physics at UCD has provided the springboard. The School has applied, jointly with the School of Physics in Trinity College Dublin, for funding to run a structured Physics PhD programme under the 5th cycle of the Irish Government's Programme for Research in Third Level Institutions (PRTLI V).

## 2. Organisation and Management

2.1 Although the School is located within the College of Engineering, Mathematics and Physical Sciences, there are on-going discussions about academic restructuring at institutional level. There is a proposal for the creation of two separate Colleges: a College of Engineering and a College of Science. If this were to happen, the School of Physics would become part of the College of Science. This proposal meets with general approval in the School. There are currently eighteen full-time academic staff, two technical staff and two administrative staff in the School. In addition there is a Research and Innovation Officer, who has held a permanent position since 2008. The appointment of two additional technical officers on five year, full-

time contracts has recently been approved. There is an Operations Manager responsible mainly for IT matters.

2.2 The School currently carries a financial deficit based on the 2009 UCD Resource Allocation model.

**Commendations**

2.3 The Review Group gained the impression that the School of Physics is working well as a stand-alone unit. It heard no arguments for formal association with other units/Schools; nor did it hear strong arguments for formal subdivision of the School into sub-sections and sub-groupings, although there is certainly a case for encouraging informal groupings and collaborations e.g., in the fields of theoretical and computational physics.

2.4 There seems, in general, to be a good esprit de corps and collegial atmosphere; a number of members of staff mentioned this explicitly. Over the past five or six years, there has been a large influx of new staff into the School both at lecturer and at professorial level; integration of these new recruits into the life of the School seems to have been reasonably successful.

2.6 The various research groups in the School seem to be well integrated although they would benefit by a future co-location (see Section 3 below).

2.6 The re-invigoration of *Physics-Soc* is welcomed.

2.7 The Head of School is currently in the second of her three years of appointment; she is clearly engaged, committed to academic excellence and working extremely hard with very little support from the University to manage the affairs of the School. She seems to carry the weight of management and administration within the School, without adequate recognition or recompense from the University.

2.8 In addition to the School Committee, which meets every four-six weeks, there is a School Management group which meets less regularly. This consists of Head of School, Head of Teaching and Learning, School Manager, Chief Technical Officer, Head of Subject, Head of Research and Innovation and Head of Graduate Studies.

2.9 The Head of School is clearly concerned to balance workloads evenly, while sensitive to the different needs of individual academic staff.

2.10 The Head of School is clearly aware of the importance of enabling all staff and students to contribute to the development of School policies and procedures.

2.11 The Head of School is clearly aware of the importance of regular communication with staff members. She meets with untenured academic staff quarterly and tenured staff yearly to discuss their career development. She meets with administrative staff monthly to discuss School matters. She also holds regular, informal meetings with the Technical Officers, the Operations Manager and the Research and Innovation Officer.

2.12 The School takes its current financial deficit very seriously. It has worked hard in recent years to reduce this deficit, mainly by reducing its space

requirements and improving its Full-Time Equivalent student numbers. The retirement of a number of technical staff has also helped in this regard.

**Recommendations:**

2.13 There is a need to clarify the organisational structure of the School and for more formal and regular meetings of the School Management group.

2.14 It may be useful to include postgraduate and postdoctoral (and possibly undergraduate) representatives at School meetings.

2.15 It may be useful to include Technical Officers at School meetings.

2.16 The Head of School's heavy managerial and administrative load should be alleviated, for example by enabling a teaching buy-out, as happens with many leadership posts. Filling the currently vacant administrative post in the School office would certainly also help.

2.17 It could be helpful to establish an 'early career group' of academic staff that would have real input into the running and planning of the School.

2.18 It would be helpful to have a formal policy of research leave in the School and to establish a rota for this.

2.19 There is a need for better integration of postgraduate students (including taught Masters students) and postdoctoral students into the life of the School, for example, by way of weekly brown bag lunches with discussion of work-in-progress, research colloquia or social events; it might be helpful to establish a committee of postgraduates/postdoctoral students, possibly including one or two academic staff, to plan such academic and social events in the School.

2.20 A small number of academic staff expressed dissatisfaction with teaching and/or administrative workloads. In the case of the administrative workload, the main problem seems to be the increased amount of bureaucracy at College and University level. This increased amount of bureaucracy has resulted in a worrying level of stress and exhaustion for some members of staff. The University should work towards reducing bureaucracy, in particular, towards avoiding duplication of requests for information or policy documents. It should also explore the possibility of reducing the number of College committees that School representatives are obliged to attend on a regular basis.

2.21 The School has been successful in reducing its financial deficit but the overheads costs to the School for central services have risen in recent years. Reasons for the rises have not always been made clear to the School. This is demoralising and does not help to motivate further efforts to reduce the deficit. The Review Group is mindful of the difficult financial circumstances in which the University finds itself but recommends that there should be no further increase in central costs without convincing justification and that every effort should be made to communicate with the School about the methods used to allocate resources so that it can understand what is being provided in return for its contribution.

2.22 The School is currently experiencing major difficulties with e-procurement (also noted in Section 8 below). This problem is resulting in a significant loss

of administrative staff time and needs to be resolved as a matter of urgency. E-procurement was designed to facilitate bulk central purchasing and reduce time required manually to chase up invoices/payments. If used properly this should be the case.

## 3. Staff and Facilities

3.1 Support of an adequate number of technical and administrative staff are very important to the efficient running of the School. The recent and continuing wave of retirements among members of the technical staff has greatly reduced its size. The recent approval of two five-year technical staff positions is welcome and important. In addition to the operation of undergraduate labs, good mechanical and electronic workshops are necessary in any Physics department.

3.2 Thus, the future financing of these workshops is an important issue. It may be hoped that the recent large increase in research funding will provide sufficient income to maintain the workshops at their present level. If this proves inadequate then cooperation and sharing of resources with workshops in other schools e.g. Chemistry and Engineering should be investigated.

3.3 The current administrative staff are exceptionally hard-working and dedicated but are overburdened. The recent increase in academic staff and research groups has increased their workload. Measures to relieve the current situation should be implemented as soon as practical.

3.4 The recent appointment of a Research and Innovation Officer has played an important role in the recent success of a major research proposal for the exploration of Extreme Ultraviolet (EUV) sources for industrial applications.

3.5 This resource will be very useful in the future in view of the likely increase in EU funding applications. One point that needs clarification is the exact career trajectory of this position.

3.6 There are substantial deficiencies in the facilities and infrastructure that need to be addressed as soon as financing can be found. These are particularly acute in the teaching lab and on the upper floors of Science North. All models including private sources of funds should be explored. The present arrangement whereby significant parts of the School are housed in the Engineering and other buildings hinders the integration of the new members into the School; at the very least, steps should be taken to encourage and increase informal contacts among the academic staff.

### Commendations

3.7 The Research and Innovation Officer is a key position that is enabling the staff to apply and win research grants and achieve innovative developments.

3.8 There is a very good local library/reading space for 3$^{rd}$ and 4$^{th}$ year students.

3.9 Undergraduate and postgraduate students and staff are very appreciative of the support offered by the workshops.

**Recommendations**

3.10 There is an urgent need to clarify the status of the Research and Innovation Officer and to issue an appropriate contract.

3.11 There is a need to maintain the traditionally excellent electronic and mechanical workshop, if necessary through cooperative arrangements with other Schools, e.g. Engineering and Chemistry. Overhead funds from research grants should be contributing to these workshops as they are a key core resource for the Physics research and teaching programmes.

3.12 There is an urgent need to replace the currently vacant administrative post (see also Section 2 above).

3.13 There is a need to develop appropriate reading space for undergraduate students for 1st and 2nd stage students along the lines of that currently available to students at a more advanced stage.

3.14 A more comprehensive IT support service should be configured, possibly on a cross-school basis. Furthermore, there is a lack of clarity as to who provides computational resources and IT support for the ACAM group that needs to be resolved.

3.15 There is a need to introduce more informal contacts not just among students (see Section 2 above) but also among the academic staff, e.g. by organising a monthly brown bag lunch etc.

**4. Teaching, Learning and Assessment**

4.1 The School of Physics provides a comprehensive teaching programme in physics including astronomy, space science and theoretical physics. In addition to the teaching of specialised physics students, a wide range of inter-programme, "service" teaching to other Schools, such as Medicine, Agriculture, Engineering etc., is delivered. The latter programmes provide a substantial income to the School. The experiences reported by students (both undergraduate and postgraduate) were generally very positive.

4.2 The staff has recently been substantially rejuvenated by new recruitment bringing in additional expertise and ideas to the teaching process and the course contents. A strong dedication to teaching is present among the staff, even if the teaching load is considered heavy by a number of staff members, given their research commitments and administrative duties. The teaching load is especially demanding for the younger and less experienced teachers, who have to invest heavily in delivering new courses while they are at a crucial point in establishing a viable research career. The inter-programme teaching is pursued with proper sensitivity to specific needs; considerable efforts are invested in responding to the demands of the actual situation, as demonstrated, for example, by the thorough restructuring of the physics module for medical students. The Review Group agrees with staff in the School that it is important that physics teaching is executed by physicists who have a proper research background.

4.3 From the questionnaires and the interactions with student representatives during the review, it was apparent that the efforts of the staff are highly

appreciated by the students, who largely consider their teachers to be dedicated, sensitive to needs, and accessible. Attending lectures is generally regarded as rewarding. However, while the demands on the students are not held to be excessive, better coordination between teachers and modules is desirable to avoid the unintentional imposition of an overly high workload on occasion.

4.4 The laboratory work in the 3rd and 4th years is largely pursued on an individual basis, challenging the individual students to attain proper experimental problem-solving skills. This approach, which seems to be rather specific to UCD/Ireland, is appreciated by the students, but is quite time consuming and should possibly be slightly reduced in favour of an increased theoretical approach such as is prevalent in other places, including the US. It is very evident that the laboratory equipment provided, including computers, is antiquated and disconnects the students from the radically different situation they encounter in society and industry. In combination with the recent significant reduction in technical staff, it has become a major challenge to keep the laboratories running properly; this is a problem that needs to be addressed.

4.5 The UCD School of Physics, like many other such departments elsewhere, faces a substantial problem with diminishing student recruitment, making the teaching operations less viable in maintaining the required income to finance the efforts invested. While the outreach programme to schools etc. seems to be energetic and pursued enthusiastically, physics as a subject might need better exposure and a clearer identity in UCD's information portfolio. This is particularly the case in view of the fact that the Omnibus entry approach, while having attractions, seems to have led to a reduction in spontaneous appreciation of the fascination of physics as a challenging endeavour. The Review Group holds that there could be considerable benefits in developing greater critical mass in key areas amongst the various institutes of Physics that exist in the greater Dublin area. In particular this could be encouraged at the postgraduate student level.

***Recruitment and entry of students***

4.6 With the move to Omnibus entry only to Science, there is a general fear that if physics (with its challenging fields) lacks clear visibility at the entry stage, students may be lost to competing institutions within Ireland. A 'clear physics degree' is useful as an entry path to a number of subsequent careers often outside physics. Some of the key strengths in the School of Physics do not currently have visibility in the UCD undergraduate prospectus (2010). The 'theoretical physics' option would benefit from being renamed 'theoretical and computational physics'. Particle physics, nano-bio physics and new imaging techniques for biological materials also need to be made more prominent in the prospectus.

**Commendations**

4.7 The School of Physics provides a comprehensive teaching programme in physics including astronomy, space science and theoretical physics.

4.8 The experiences reported by students (both undergraduate and postgraduate) were generally very positive.

4.9 A strong dedication to teaching is present among the staff even if the teaching load is considered heavy by a number of staff members, given their research commitments, and administrative duties.

4.10 The inter-programme teaching is pursued with proper sensitivity to specific needs; considerable efforts are invested in responding to the demands of the actual situation, as demonstrated, for example, by the thorough restructuring of the physics module for medical students.

4.11 From the questionnaires and the interactions with student representatives during the review, it was apparent that the efforts of the staff are highly appreciated by the students, who largely consider their teachers to be dedicated, sensitive to needs, and accessible.

**Recommendations**

4.7 It is important that physics teaching is executed by physicists who have a proper research background.

4.8 There should be better coordination between teachers and modules to avoid an unintentional extremely high workload for students at certain times (i.e. avoid assignments on a number of modules in the same week).

4.9 The possibility of moving away from individual experiments in final year towards more advanced research projects (possibly hosted by the research groups in the School) should be considered.

4.10 There should be increased outreach to schools to inform them about new directions in the UCD School of Physics, especially in the emerging area of biophysics (both experimental and simulation fields) and in molecular simulations for materials, energy and nano-bio sciences.

4.11 It should be emphasised that UCD has significant strengths in the fields of particle physics at the Large Hadron Collider at CERN and in astrophysics on the hot topic of gamma ray bursts.

4.12 The option of 'theoretical physics' should be extended to include more computational physics and it should be renamed 'theoretical and computational physics'.

## 5. Curriculum Development and Review

5.1 There is a general problem with students having insufficient background in mathematics for many of the physics courses offered. Future efforts in restructuring mathematics modules are required to better fit the needs of physicists. It is important that the need for relevant background knowledge is clearly stated in course module descriptors. Appropriate use of module pre-requisites and co-requisites could help in this regard.

5.2 In interviews with representatives from industry and agencies, it became clear that student deployment to industry or research placements (preferably in different institutions) for a minimum of half a year as part of their degree would considerably increase their attractiveness to employers by adding experience and 'soft' skills. In discussions with students, the possibility of

such placements was viewed positively, although there were worries about any consequent dilution of core skills. It is important, therefore, that placements should not be at the expense of core training in physics.

5.3 The School has recently implemented a taught Masters programme that is still at the early stages. While student uptake is low, feedback from students was very positive. More efforts are required to increase student intake to this programme. Higher level courses at the postgraduate level are essential parts of structured PhD programmes. These could be offered across the various Physics institutes in the Dublin area.

**Recommendations**

5.4 Restructuring of mathematics modules is required to better fit the needs of physicists.

5.5 Consideration should be given to the introduction of a 6-month industry placement as part of the undergraduate physics programme.

5.6 There is a need to publicise the taught Masters programme in nano-bio sciences among biology students by emphasizing the traditional role of physics in developing new instruments (e.g. in imaging biological structures) that will be increasingly important in biology in the future.

## 6. Research, Innovation and Transfer of Knowledge

6.1 A considerable restructuring and renewal of the research programme at the School of Physics has occurred in recent years. Traditional strengths of the School such as spectroscopy, astronomy, particle physics, radiation physics and theoretical physics have been complemented by new hirings in the areas of nano-bio, imaging and computational physics and simulation fields. This has added active and promising new research directions to the Irish research arena. Substantial funding through the Science Foundation Ireland (SFI) has strongly facilitated this process. The success by the spectroscopy group in formulating and pursuing industrially relevant and well-funded research is also specially noted. The Review Group recognises the role of the Research and Innovation Officer in facilitating the School's securing of very substantial external funding increases. These key achievements are impressive and should be adequately rewarded.

6.2 Elementary particle physics is an area quite unique to UCD on the Irish scene and is important, not the least in stirring the imagination and enthusiasm of prospective students at times of diminishing recruitment. The future of particle physics and its senior staff needs particular attention. Particle physics is entering an exciting time with new experiments at CERN, which will generate a lot of publicity and in turn will excite the ambitious students. The presence of an active particle physics group at UCD participating in the CERN experiments should be publicised. Astronomy is another area which attracts ambitious and talented students. The astronomy group is participating in several large international collaborations exploring issues at the forefront of current research, such as the origin of the mysterious recently discovered gamma ray bursts and this should be publicised when the occasion arises.

6.3 Radiation physics is a traditional strength at UCD – as attested by representatives for environmental safety and health care/medical industries. It is important to maintain the research capability in this area in the future when the incumbent Professor retires.

6.4 Theoretical physics is prominent at UCD and is pursued by several strong scientists. The recent addition of a very active group in computational and simulation physics in the new Atlantic Centre for Atomistic Modelling (ACAM) adds a new dimension to the School. This is the Irish node of the pan-European Centre Européen de Calcul Atomique et Moléculaire (CECAM) network with a mission to develop advanced simulation techniques and algorithms for applications in materials, energy and nano-bio sciences. Taken together they form a strong and broad research team. In view of the probability of major cuts in financing of the universities and research because of the financial crisis, the possibility of closer collaboration with the other universities in the Dublin area and also with the Dublin Institute of Advanced Studies (DIAS) could be explored further (see also Section 5 above).

6.5 The financial crisis has increased competition for financial support, which is likely to be reduced in the future. An increased emphasis on EU funding will be necessary. Unfortunately the EU has very bureaucratic procedures. The School should try to make full use of the expertise of the Research and Innovation Officer in this respect, too, in order to reduce the bureaucratic load on the academic staff and to enhance success rates.

**Commendations**

6.6 A considerable restructuring and renewal of the research programme at the School of Physics has occurred in recent years.

6.7 Success by the spectroscopy group in formulating and pursuing industrially relevant and well-funded research is specially noted.

6.8 Elementary particle physics is an area quite unique to UCD on the Irish scene and is important, not the least in stirring the imagination and enthusiasm of prospective students at times of diminishing recruitment.

6.9 Astronomy is another area which attracts ambitious and talented students.

6.10 The presence of an active particle physics group at UCD participating in the CERN experiments should be publicised.

6.11 Radiation physics is a traditional strength at UCD.

6.12 Theoretical physics is prominent at UCD and is pursued by several strong scientists. Taken together they form a strong and broad research team.

6.13 The securing by the School of Physics of very substantial external funding is impressive. The role of the School's Research and Innovation Officer in facilitating these achievements is recognised.

**Recommendations**

6.14 The School should try to coordinate its grant applications to reduce the bureaucratic load and enhance success rates.

6.15 The benefits to be had from enhanced coordination in some areas of research activities across institutions in the Dublin area, could be examined.

6.16 There is a need to ensure maintenance of research capability in radiation physics in the future given the pending retirement in this area

## 7. Management of Quality and Enhancement

7.1 Within the School there is a range of mechanisms in place for ensuring quality of academic standards including accreditation by the Institute of Physics. There is no evidence of grade inflation, at least since 2002; the rate of first class honours degrees is comparatively high, especially in theoretical physics, but seems to reflect accurately the quality of student performance. The School monitors its research performance in terms of research funding, number of postgraduate students, publication measures (H-indices), etc.

### Commendations

7.2 There is significant evidence of a number of recent attempts to foster early and lasting student engagement.

7.3 There have been impressive efforts to improve the quality of service teaching. Of particular note is the recent successful overhaul of physics courses offered for medical students, leading to use of problem-based learning methods employing medical examples that engage the students in physics concepts.

7.4 Some popular new modules have been developed (e.g. the astronomy module).

7.5 Technical officers have been offered further training opportunities and some have availed of them very profitably.

7.6 There is evidence of imaginative engagement with the question of space requirements and how to use space differently, for example, with a view to facilitating enquiry-based approaches to physics.

### Recommendations

7.7 Due to the combination of omnibus and denominated entry, there are considerable difficulties in ensuring the quality of undergraduate intake and maintaining the competitiveness of the physics degree in the Irish context. The Review Group emphasises the need for ongoing efforts to ensure key areas of interest are prominent in the prospectus documents. (See also Section 4 above.)

7.8 The Review Group also emphasises the need for a greater proportion of research overhead support to come back to the School in order to underpin the basic infrastructure. This is crucial from the point of view of staff morale, since it shows that success in achieving research funding is good for the whole School.

7.9 The recent significant improvements to service teaching (e.g. the introduction of physics for medical students) require considerable time commitment from

staff and have been inadequately funded. Funding for this should be increased.

7.10 There is a need for on-going review of the physics curricula in light of new staff expertise.

7.11 The School should seriously consider developing new maths modules designed for physics students.

7.12 More emphasis should be placed on internationalisation, in particular, on sending undergraduate, postgraduate and postdoctoral students, as well as staff, abroad and on attracting doctoral and postdoctoral students from abroad.

7.13 The School should establish a practice of regularly inviting distinguished speakers and young researchers from outside the School for invited speaker seminars.

7.14 The School should form a postgraduate student committee; one of its functions could be to organise regular research seminars that cut across research groups.

7.15 The School should systematically keep track of graduates and alumni that could help with donations and funding for key initiatives.

## 8. Support Services

8.1 Matters relating to Administrative and Technical Support services within the School have been noted in Section 3 above. Administrative support services are evidently over-stretched. Difficulties with the UCD E-procurement system are currently responsible for very significant absorption of time and effort. These are clearly a cause of great frustration to the staff members who deal directly with the system; delays resulting from operation of this system are having serious adverse effects on relationships with suppliers, thereby compounding the difficulties.

8.2 As noted above, there has been a sharp drop in the number of technical support staff available to the School over recent years. A previous cohort of seven Mechanical and five Electronic Technicians, has now reduced to two plus one person in IT support. One technician is effectively occupied full time for 1st Year Laboratories (including repair and maintenance carried out during the summer); one other technician is primarily active in the Mechanical Workshop. The Review Group welcomes UCD's agreement to recruit two new technical staff on five-year contracts to support research.

8.3 IT Support within School is clearly problematic. There are too many out-dated computers with a very diverse range of operating systems, a situation that seems to result directly from a lack of funds to up-date hardware and software. Students interviewed by the Review Group highlighted that some of the computers were older than they were. Unquantified but probably substantial inefficiencies and lost productivity arise throughout the School as a consequence.

8.4 Within current resource allocation procedures, UCD IT Services apply an annual charge per hard-wired network point. The annual charge incurred by the School of Physics in 2008-09 was reduced from the charge incurred in 2007-08. It is unclear to School management whether these charges correctly reflect the actual number of network points in the School. The mission of UCD IT Services is to provide all central IT applications, support and infrastructure for staff and students throughout the University. The scope of the service includes Academic & Administrative Systems, Research IT, Teaching & Learning Technologies and UCD Web Services. There is a perception among staff in the School that the attributed costs are rather high, given that a very substantial local IT support burden remains with the School.

8.5 The Library charges and facilities appear not to be matched to the requirements of the School. Attributed RAM charges in 2008-09, were reduced from 2007-08. Major difficulties were reported to have arisen from the policy of removing e-access to journals based on a historical cost-per-download.

8.6 The existing UCD James Joyce Library is not structured in a way that encourages use by 3rd & 4th Year physics undergraduates. The School maintains a small Library/Study room (which also serves as a School Meeting Room), which appears to be a very well supported and successful centre for student learning. As also noted above, a similar facility for 1st & 2nd year students would be very much welcomed by the students and would help create a stronger community of students who identify strongly with Physics.

8.7 Premises RAM charges are very burdensome. Whilst the University block grant allocation methodology does favour laboratory-based disciplines, the magnitude of the multiplying factor used does not appear to be sufficient to cover the true costs associated with the necessary facilities and supports.

8.8 The RAM attributed costs for Support Units, Payroll, HR etc. in 2008-09, were up very substantially from 2007-08. As also noted in Section 2 above, these are based on “Miscellaneous Drivers” which are not transparent to the School and over which the School has no apparent influence. The School acknowledges that HR support (via EMPS HR Partner) has improved significantly in recent years.

8.9 Significant College-related RAM costs are attributed to the School. These include a share of the EMPS College Office, the Science Programme Office and the Graduate School Office.

In return, the School avails of the following:

- Financial and budgetary management
- Planning and administration
- Research services/Administrative assistance with Research Grant Applications (as indicated, the School of Physics employs a full time Research & Innovation Officer, separately financed).
- Marketing and communications

- Graduate School management
- Human resources support

**Recommendations**

8.10 The Review Group calls for a more comprehensive configuration of I.T. support service, possibly on a cross-School basis and in active collaboration with UCD IT Services. The I.T. support requirements of the ACAM group and others physics researchers located in the Engineering & Materials Science Centre should be considered as part of any revision to current arrangements.

8.11 The feasibility of providing a study-room facility for 1st & 2nd year students should be investigated.

8.12 A Financial Analysis / Business Planning Tool should be made available to the Head of School to enable a more accurate quantification of the impact of future developments in student enrolment, research activity, space usage etc.; this would also facilitate sensitivity analysis.

## 9. External Relations

9.1 The School of Physics maintains strong international linkages and collaboration in Research. Also, the School has an excellent tradition of very low cost collaboration with well resourced international research consortia in Particle Physics & Astro-Physics (CERN etc). This facilitates regular exchange visits by staff and graduate students.

9.2 Attracting good students into Physics degree programmes presents a constant challenge. The UCD Science Programme Office employs a full time marketing person who is actively involved in efforts to recruit new students to Science through School Visits / Open Days etc. Physics staff members are invited to make specialist presentations and, in general, are very enthusiastic and supportive of these efforts.

9.3 The School makes substantial efforts to support a "Transition Year" student experience week, but the number of students ultimately recruited remains very small.

9.4 The Review Group was not presented with evidence of significant volume of incoming & outgoing undergraduate student exchanges (see also the remarks on internationalisation in Section 7 above).

9.5 The School maintains good links with the Institute of Physics and continues to attain Institute of Physics Accreditation of its degree programmes.

9.6 The Review Group noted that, whilst staff contacts with alumni are often maintained on an informal basis, no formal Alumni Association has ever been established (see also Section 7 above).

**Commendations**

9.7 The School of Physics maintains strong international linkages and collaboration in Research. Also, the School has an excellent tradition of very

low cost collaboration with well resourced international research consortia in Particle Physics & Astro-Physics (CERN etc). This facilitates regular exchange visits by staff and graduate students.

9.8 Physics staff members, in general, are very enthusiastic and supportive of efforts to recruit new students to Science through, for example, School Visits/Open Days.

9.9 The School maintains good links with the Institute of Physics and continues to attain Institute of Physics Accreditation of its degree programmes.

**Recommendations**

9.10 The Review Group recommends that current student recruitment efforts be maintained and strengthened and that all staff be encouraged to contribute to this important effort.

9.11 The School should continue to nurture and expand its international linkages, which have proven to be very valuable to date.

## 10. Summary of Commendations and Recommendations

Paragraph references below, refer to the relevant paragraphs in the Report text.

### A. Organisation and Management

Commendations

2.3 The Review Group gained the impression that the School of Physics is working well as a stand-alone unit. It heard no arguments for formal association with other units/Schools; nor did it hear strong arguments for formal subdivision of the School into sub-sections and sub-groupings, although there is certainly a case for encouraging informal groupings and collaborations e.g., in the fields of theoretical and computational physics.

2.4 There seems, in general, to be a good esprit de corps and collegial atmosphere; a number of members of staff mentioned this explicitly. Over the past five or six years, there has been a large influx of new staff into the School both at lecturer and at professorial level; integration of these new recruits into the life of the School seems to have been reasonably successful.

2.6 The various research groups in the School seem to be well integrated although they would benefit by a future co-location (see Section 3 below).

2.6 The re-invigoration of *Physics-Soc* is welcomed.

2.7 The Head of School is currently in the second of her three years of appointment; she is clearly engaged, committed to academic excellence and working extremely hard with very little support from the University to manage the affairs of the School. She seems to carry the weight of management and administration within the School, without adequate recognition or recompense from the University.

2.8 In addition to the School Committee, which meets every four-six weeks, there is a School Management group which meets less regularly. This consists of Head of School, Head of Teaching and Learning, School Manager, Chief Technical Officer, Head of Subject, Head of Research and Innovation and Head of Graduate Studies.

2.9 The Head of School is clearly concerned to balance workloads evenly, while sensitive to the different needs of individual academic staff.

2.10 The Head of School is clearly aware of the importance of enabling all staff and students to contribute to the development of School policies and procedures.

2.11 The Head of School is clearly aware of the importance of regular communication with staff members. She meets with untenured academic staff quarterly and tenured staff yearly to discuss their career development. She meets with administrative staff monthly to discuss School matters. She also holds regular, informal meetings with the Technical Officers, the Operations Manager and the Research and Innovation Officer.

2.12 The School takes its current financial deficit very seriously. It has worked hard in recent years to reduce this deficit, mainly by reducing its space requirements and improving its Full-Time Equivalent student numbers. The retirement of a number of technical staff has also helped in this regard.

Recommendations:

2.13 There is a need to clarify the organisational structure of the School and for more formal and regular meetings of the School Management group.

2.14 It may be useful to include postgraduate and postdoctoral (and possibly undergraduate) representatives at School meetings.

2.15 It may be useful to include Technical Officers at School meetings.

2.16 The Head of School's heavy managerial and administrative load should be alleviated, for example by enabling a teaching buy-out, as happens with many leadership posts. Filling the currently vacant administrative post in the School office would certainly also help.

2.17 It could be helpful to establish an 'early career group' of academic staff that would have real input into the running and planning of the School.

2.18 It would be helpful to have a formal policy of research leave in the School and to establish a rota for this.

2.19 There is a need for better integration of postgraduate students (including taught Masters students) and postdoctoral students into the life of the School, for example, by way of weekly brown bag lunches with discussion of work-in-progress, research colloquia or social events; it might be helpful to establish a committee of postgraduates/postdoctoral students, possibly including one or two academic staff, to plan such academic and social events in the School.

2.20 A small number of academic staff expressed dissatisfaction with teaching and/or administrative workloads. In the case of the administrative workload,

the main problem seems to be the increased amount of bureaucracy at College and University level. This increased amount of bureaucracy has resulted in a worrying level of stress and exhaustion for some members of staff. The University should work towards reducing bureaucracy, in particular, towards avoiding duplication of requests for information or policy documents. It should also explore the possibility of reducing the number of College committees that School representatives are obliged to attend on a regular basis.

2.21 The School has been successful in reducing its financial deficit but the overheads costs to the School for central services have risen in recent years. Reasons for the rises have not always been made clear to the School. This is demoralising and does not help to motivate further efforts to reduce the deficit. The Review Group is mindful of the difficult financial circumstances in which the University finds itself but recommends that there should be no further increase in central costs without convincing justification and that every effort should be made to communicate with the School about the methods used to allocate resources so that it can understand what is being provided in return for its contribution.

2.22 The School is currently experiencing major difficulties with e-procurement (also noted in Section 8 below). This problem is resulting in a significant loss of administrative staff time and needs to be resolved as a matter of urgency. E-procurement was designed to facilitate bulk central purchasing and reduce time required manually to chase up invoices/payments. If used properly this should be the case.

**B. Staff and Facilities**

Commendations

3.7 The Research and Innovation Officer is a key position that is enabling the staff to apply and win research grants and achieve innovative developments.

3.8 There is a very good local library/reading space for 3rd and 4th year students.

3.9 Undergraduate and postgraduate students and staff are very appreciative of the support offered by the workshops

Recommendations

3.10 There is an urgent need to clarify the status of the Research and Innovation Officer and to issue an appropriate contract.

3.11 There is a need to maintain the traditionally excellent electronic and mechanical workshop, if necessary through cooperative arrangements with other Schools, e.g. Engineering and Chemistry. Overhead funds from research grants should be contributing to these workshops as they are a key core resource for the Physics research and teaching programmes.

3.12 There is an urgent need to replace the currently vacant administrative post (see also Section 2 above).

3.13 There is a need to develop appropriate reading space for undergraduate students for 1st and 2nd stage students along the lines of that currently available to students at a more advanced stage.

3.14 A more comprehensive IT support service should be configured, possibly on a cross-school basis. Furthermore, there is a lack of clarity as to who provides computational resources and IT support for the ACAM group that needs to be resolved.

3.15 There is a need to introduce more informal contacts not just among students (see Section 2 above) but also among the academic staff, e.g. by organising a monthly brown bag lunch etc.

**C. Teaching, Learning and Assessment**

Commendations

4.7 The School of Physics provides a comprehensive teaching programme in physics including astronomy, space science and theoretical physics.

4.8 The experiences reported by students (both undergraduate and postgraduate) were generally very positive.

4.9 A strong dedication to teaching is present among the staff even if the teaching load is considered heavy by a number of staff members, given their research commitments, and administrative duties.

4.10 The inter-programme teaching is pursued with proper sensitivity to specific needs; considerable efforts are invested in responding to the demands of the actual situation, as demonstrated, for example, by the thorough restructuring of the physics module for medical students.

4.11 From the questionnaires and the interactions with student representatives during the review, it was apparent that the efforts of the staff are highly appreciated by the students, who largely consider their teachers to be dedicated, sensitive to needs, and accessible.

Recommendations

4.7 It is important that physics teaching is executed by physicists who have a proper research background.

4.8 There should be better coordination between teachers and modules to avoid an unintentional extremely high workload for students at certain times (i.e. avoid assignments on a number of modules in the same week).

4.9 The possibility of moving away from individual experiments in final year towards more advanced research projects (possibly hosted by the research groups in the School) should be considered.

4.10 There should be increased outreach to schools to inform them about new directions in the UCD School of Physics, especially in the emerging area of biophysics (both experimental and simulation fields) and in molecular simulations for materials, energy and nano-bio sciences.

4.11 It should be emphasised that UCD has significant strengths in the fields of particle physics at the Large Hadron Collider at CERN and in astrophysics on the hot topic of gamma ray bursts.

4.12 The option of 'theoretical physics' should be extended to include more computational physics and it should be renamed 'theoretical and computational physics'.

**D. Curriculum Development and Review**

Recommendations

5.4 Restructuring of mathematics modules is required to better fit the needs of physicists.

5.5 Consideration should be given to the introduction of a 6-month industry placement as part of the undergraduate physics programme.

5.6 There is a need to publicise the taught Masters programme in nano-bio sciences among biology students by emphasizing the traditional role of physics in developing new instruments (e.g. in imaging biological structures) that will be increasingly important in biology in the future.

**E. Research, Innovation and Transfer of knowledge**

Commendations

6.6 A considerable restructuring and renewal of the research programme at the School of Physics has occurred in recent years.

6.7 Success by the spectroscopy group in formulating and pursuing industrially relevant and well-funded research is specially noted.

6.8 Elementary particle physics is an area quite unique to UCD on the Irish scene and is important, not the least in stirring the imagination and enthusiasm of prospective students at times of diminishing recruitment.

6.9 Astronomy is another area which attracts ambitious and talented students.

6.10 The presence of an active particle physics group at UCD participating in the CERN experiments should be publicised.

6.11 Radiation physics is a traditional strength at UCD.

6.12 Theoretical physics is prominent at UCD and is pursued by several strong scientists. Taken together they form a strong and broad research team.

6.13 The securing by the School of Physics of very substantial external funding is impressive. The role of the School's Research and Innovation Officer in facilitating these achievements is recognised.

Recommendations

6.14 The School should try to coordinate its grant applications to reduce the bureaucratic load and enhance success rates.

6.15 The benefits to be had from enhanced coordination in some areas of research activities across institutions in the Dublin area, could be examined.

6.16 There is a need to ensure maintenance of research capability in radiation physics in the future given the pending retirement in this area.

**F. Management of Quality and Enhancement**

Commendations

7.2 There is significant evidence of a number of recent attempts to foster early and lasting student engagement.

7.3 There have been impressive efforts to improve the quality of service teaching. Of particular note is the recent successful overhaul of physics courses offered for medical students, leading to use of problem-based learning methods employing medical examples that engage the students in physics concepts.

7.4 Some popular new modules have been developed (e.g. the astronomy module).

7.5 Technical officers have been offered further training opportunities and some have availed of them very profitably.

7.6 There is evidence of imaginative engagement with the question of space requirements and how to use space differently, for example, with a view to facilitating enquiry-based approaches to physics.

Recommendations

7.7 Due to the combination of omnibus and denominated entry, there are considerable difficulties in ensuring the quality of undergraduate intake and maintaining the competitiveness of the physics degree in the Irish context. The Review Group emphasises the need for ongoing efforts to ensure key areas of interest are prominent in the prospectus documents. (See also Section 4 above.)

7.8 The Review Group also emphasises the need for a greater proportion of research overhead support to come back to the School in order to underpin the basic infrastructure. This is crucial from the point of view of staff morale, since it shows that success in achieving research funding is good for the whole School.

7.9 The recent significant improvements to service teaching (e.g. the introduction of physics for medical students) require considerable time commitment from staff and have been inadequately funded. Funding for this should be increased.

7.10 There is a need for on-going review of the physics curricula in light of new staff expertise.

7.11 The School should seriously consider developing new maths modules designed for physics students.

7.12 More emphasis should be placed on internationalisation, in particular, on sending undergraduate, postgraduate and postdoctoral students, as well as staff, abroad and on attracting doctoral and postdoctoral students from abroad.

7.13 The School should establish a practice of regularly inviting distinguished speakers and young researchers from outside the School for invited speaker seminars.

7.14 The School should form a postgraduate student committee; one of its functions could be to organise regular research seminars that cut across research groups.

7.15 The School should systematically keep track of graduates and alumni that could help with donations and funding for key initiatives.

**G. Support Services**

Recommendations

8.10 The Review Group calls for a more comprehensive configuration of I.T. support service, possibly on a cross-School basis and in active collaboration with UCD IT Services. The I.T. support requirements of the ACAM group and others physics researchers located in the Engineering & Materials Science Centre should be considered as part of any revision to current arrangements.

8.11 The feasibility of providing a study-room facility for 1st & 2nd year students should be investigated.

8.12 A Financial Analysis / Business Planning Tool should be made available to the Head of School to enable a more accurate quantification of the impact of future developments in student enrolment, research activity, space usage etc.; this would also facilitate sensitivity analysis.

**H. External Relations**

Commendations

9.7 The School of Physics maintains strong international linkages and collaboration in Research. Also, the School has an excellent tradition of very low cost collaboration with well resourced international research consortia in Particle Physics & Astro-Physics (CERN etc). This facilitates regular exchange visits by staff and graduate students.

9.8 Physics staff members, in general, are very enthusiastic and supportive of efforts to recruit new students to Science through School Visits / Open Days etc.

9.9 The School maintains good links with the Institute of Physics and continues to attain Institute of Physics Accreditation of its degree programmes.

Recommendations

9.10 The Review Group recommends that current student recruitment efforts be maintained and strengthened and that all staff be encouraged to contribute to this important effort.

9.11 The School should continue to nurture and expand its international linkages, which have proven to be very valuable to date.

# Appendix 1

## UCD School of Physics Response to the Review Group Report

The UCD School of Physics welcomes the Quality Review Group's report, which addresses the many strands of the School's activities. The report commends extensively the high quality of teaching and research in the School, delivered by a dedicated team of academics, graduate students, research fellows and support staff. The report recognises the extremely challenging environment, both internal and external, for Physics as a discipline and acknowledges the positive response by the School to that environment.

The School's Self-Assessment report, along with the commendations and recommendations from the Review Group's report, will form the basis for the development of a School Quality Improvement plan, that will be used to inform the School's academic and resource planning activities for the future.

## Appendix 2


## Schedule for Review Visit to

## UCD School of Physics

## 27th April 2010 – 30th April 2010

**Tuesday, April 27th, 2010**

| | |
|---|---|
| 17.15-18.45 | RG met to review preliminary issues and to confirm work schedule and assignment of tasks for the following three days. |
| 19.30 | Dinner for the RG hosted by the Chair of the UCD Academic Council Committee on Quality |

**Wednesday, April 28th, 2010**
**Venue: Room 128, Science Centre North**

| | |
|---|---|
| 09.00-09.30 | Private meeting of Review Group (RG) |
| 09.30 – 10.15 | RG met with **College Principal** |
| 10.15-10.30 | Break |
| 10.30 –11.15 | RG met with **Head of School** and other members of senior staff nominated by the Head of School |
| 11.15 – 11.30 | Tea/coffee break |
| 11.30 – 12.15 | RG met with **SAR Coordinating Committee** |
| 12.15-12.45 | Break – RG review key observations and prepare for lunch time meeting |
| 12.45-13.45 | Working lunch (buffet) – RG met with **employers (and/or other external stakeholders)** |
| 13.45-14.15 | RG reviewed key observations |
| 14.15-15.30 | RG met with **representative group of academic staff** – primary focus on Teaching and Learning, and Curriculum issues. |
| 15.30-15.45 | RG tea/coffee break |
| 15.45-16.30 | RG met with **support staff representatives** (e.g. administrative / technical etc) |

16.30-16.35 Break

16.35-17.05 RG met with the **UCD Dean of Science and Chair of the Science Foresight Group**

17.05-17.15 Break

17.15-18.15 **Tour of facilities:**
**Science Centre North:**
Undergraduate laboratories: 3rd & 4th year
Ultrafast nano-optics & plasmonics laboratory
Spectroscopy laboratory suite

**Engineering & Materials Research Building:**
Nanolabs

18.15 RG depart

**Thursday, April 29th, 2010**
**Venue: Room 128, Science Centre North**

08.45-09.00 Private meeting of the RG

09.00-09.25 RG met with the **Head of School**

09.30-09.55 RG met with the **Deputy Head of Academic Services, UCD Library and the School's representative on the library committee**

10.00-11.00 RG met with a representative group of **postgraduate students** (taught and research) **and recent graduates** (PG and UG)

11.00-11.15 RG tea/coffee break

11.15-12.15 RG met with the **School Research Committee** (and other staff members nominated by the HoS)

12.15-12.45 Break - RG reviewed key observations and prepared for lunch time meeting

12.45-13.45 Working lunch (buffet) - RG met with **representative group of undergraduate students**

13.45-14.15 RG meting in private to review key observations

14.15-15.00 RG met with **College Finance Manager and Head of School** to outline School's financial situation

15.00-15.15 Break

15.15-16.15 RG met with **recently appointed members of staff**

16.15-17.15 RG were available for private individual meetings with staff

17.15-18.00 RG met in private to review key preliminary observations/findings and began drafting RG Report

18.00 RG depart

**Friday, April 30th, 2010**
**Venue: Room 128, Science Centre North**

09.00-09.30 Private meeting of RG

09.30-10.00 (Optional) RG met with specified University staff to clarify any outstanding issues or continue preparing draft RG Report

10.00-10.30 (Optional) RG met with Head of School to clarify any outstanding issues or continue preparing draft RG Report

10.30-10.45 Break

10.45-12.30 RG continued preparing draft RG Report

12.30-13.15 Lunch

13.15-15.30 RG finalised first draft of RG Report and feedback commendations/recommendations

15.30-15.45 Break

15.45-16.00 RG met with **Head of School** to feedback initial outline commendations and recommendations

16.15 **Exit presentation** to all available staff of the unit made by an extern member of the Review Group summarising the principal commendations/recommendations of the Review Group

16.45 Review Group departed