

Quality Assurance / Quality Improvement  
Programme for Academic Units  
2001-2002



Peer Review Group Report  
for the  
School of Physical Sciences

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## Table of Contents

	<b>Page</b>
1. Profile of the School of Physical Sciences .....	4
2. The Self-Assessment Process .....	5
3. The Peer Review Group Process.....	5
4. Findings of the Peer Review Group .....	7
5. Overall Analysis of Strengths, Weaknesses, Opportunities and Concerns.....	11
6. Recommendations for Improvement.....	13

This Quality Review Process was conducted in accordance with the legislative requirements of the Universities Act (1997). The School of Physical Sciences established a Co-ordinating Committee in 2001 and produced a comprehensive self-assessment report in March 2002. This report formed the basis of the subsequent Peer Review Group (PRG) site visit and review.

## 1. Profile of the School of Physical Sciences

### Location

The School of Physical Sciences is a constituent school of the Faculty of Science and Health of Dublin City University. The School is an active teaching and research department located in a purpose built building which was opened in 1993.

### Staff

The following table details the composition of staff within the School.

Staff	Permanent	Temporary	Total
Academic	15	3	18
Administrative	1	3	4
Technical	5	2	7
IT/Computing Support	1		1
Research (Postdoctoral)		17	17
Research (Other)		7	7
	<b>22</b>	<b>32</b>	<b>54</b>

### Programmes and Activities

The School's central activities of teaching and research are managed by the Head of School in conjunction with the Chairpersons of the Degree programme boards and by means of a committee system.

### *Teaching*

In summary the School is solely or jointly responsible for the following undergraduate and postgraduate programmes: -

	Programme	Total Numbers	FTEs
<b>Home Degrees</b>	BSc in Applied Physics	104	90
	BSc in Physics with French/German	8	6
	BSc in Science Education	55	20
	Certificate in Plasma & Vacuum Studies	23	12
	Grad Dip/MSc in Plasma & Vacuum Technology	9	9
		<b>199</b>	<b>137</b>
<b>Service Teaching</b>	Science	251	50
	Engineering	159	25
	Computing	100	20
	Humanities	59	10
		<b>569</b>	<b>105</b>
<b>Research</b>	MSc and PhD by Research	38	114
	<b>Total</b>	<b>806</b>	<b>356</b>

In addition, the School, in association with TRIP (Training and Research for Industry Programme), provides short courses aimed at industry. The programme was developed in response to perceived needs for training and consultancy in the areas of vacuum and plasma science and technology.

### *Research*

Research in the School is organised and managed within small groups of two to four academic staff with associated postgraduate and postdoctoral researchers, assisted in some cases by technical and administrative staff. The current research groups are as follows: -

- Centre for Laser Plasma Research (CLPR)
- Optical Sensor Laboratory (OSL)
- Plasma Research Laboratory (PRL)
- Semiconductor Spectroscopy Laboratory (SSL)
- Surface Science Research Laboratory (SSRL)

In 1999, DCU was awarded funding under the Programme for Research in Third Level Institutions (PRTL) for the establishment of three major research centres. Two of these centres have strong representation from the School: -

- National Centre for Plasma Sciences and Technology
- National Centre for Sensor Research

These centres form the cornerstone of current and future research in the School.

## **2. The Self-Assessment Process**

### The Quality Co-ordinating Committee

Ms. Lisa Peyton

Ms. Sarah Byrne

Dr. Tony Cafolla

Prof. Martin Henry

Mr. Alan Hughes

Dr. Colette McDonagh

Dr. Aisling McEvoy

Dr. Jean-Paul Mosnier

The School established its Quality Co-ordinating Committee in September 2001 and met fortnightly until the site visit was conducted. Surveys of staff and students were conducted in December 2001 with analysis completed in January 2002. The Self-Assessment Report was completed and circulated to the PRG in March 2002.

## **3. The Peer Review Group Process**

### The Peer Review Group (PRG)

Mr. Frank Turpin, Education Manager, Intel Ireland (Chair)

Prof. Ignatius McGovern, Department of Physics, Trinity College Dublin

Prof. Dietrich Zahn, Institut für Physik/Halbleiterphysik, Technische Universität Chemnitz

Prof. Charles McCorkell, School of Electronic Engineering, DCU

Ms. Miriam Corcoran, Head of Planning & Administration, The Library, DCU (Rapporteur)

### Overall Methodology

The Review process consisted of three discrete activities: -

1. Familiarisation with the self-assessment report provided by the School in advance of the site visit.
2. A comprehensive site visit was conducted over a period of 2 days to review and validate details of the self-assessment report.
3. The preparation and delivery of a review report documenting the findings and making recommendations for future development.

### Schedule of Activity

#### *Preliminary meeting*

An initial meeting of the PRG was held on Wednesday 3<sup>rd</sup> April with the objectives of allocating key tasks and to agree the schedule of activities for the site visit.

#### *Site Visit*

Day One began with a series of meetings with the staff of the School to consider and validate the self-assessment report. This provided the PRG with the opportunity to meet a wide representation of academic, administrative and technical support staff. This was followed by a visit to the core facilities of the School. A series of meetings was then held with undergraduates, postgraduates, researchers and graduates of the School.

The PRG noted the enthusiastic and open discussions held with representatives from both staff and students. This contributed to a successful and comprehensive site visit and optimised the validation of the self-assessment report. The PRG was particularly impressed by the consistency of positive views expressed from first year undergraduates to graduates.

On the second day, the PRG met with the President and other senior officers of the university to discuss strategic issues arising from the group's analysis of the self-assessment report. This was followed by a meeting with the Director of Library Services and the Science Librarian to discuss information delivery and service provision to the School. The meetings phase of the site visit concluded with a discussion with the Dean of Research and Dean of the Faculty of Science and Research.

### View of the Self-Assessment Report

The documentation provided to the PRG was comprehensive and candid. It was well structured, accessible and appropriately cross-referenced. In particular, the report provided useful comparative data, comprehended the perspectives of all stakeholders and did not shy away from addressing shortcomings. The recommendations at the end of each section proved a valuable tool for the work of the group.

The PRG would like to take this opportunity to commend the Self-Assessment team for producing an excellent report which greatly facilitated the work of the group. In addition their Report provides a firm platform from which a successful strategic plan may be launched for the School.

## 4. Findings of the Peer Review Group

### Organisation and Management

The management style is team-based and participative. Committees dealing with safety, computing, research and quality facilitate the internal management of the School. The head of school role is rotated. There is extensive and effective interaction with the student body through class group co-ordinators, programme leaders, and surveying. Academic workload is balanced across teaching, research and administration except for those on secondment to the research centres.

A secretary (grade2) provides local administration. The School receives administrative services from the Faculty office. Technical support is structured under 4 headings; workshop, direct lab support for teaching, IT, and research.

Whilst the School is established as other schools are, the School is distinguished by the extent to which it is involved in and identifies with the large scale research centres. 75% of the staff are associated with a research centre, and staff lead two of the centres. This has benefited the School and the University. However in management terms it has the potential to be confusing in the absence of clear guidelines on reporting. Just how such a complex structure should determine workload mix is unclear. The traditional role of a staff member in an academic department carries with it the expectation of a combined teaching and research workload. That teaching is not a requirement for a staff member wholly in a research centre is a development that needs to be kept under review.

The School is at the end of a hectic period of strategic development that saw it make a major contribution to the establishment of the research centres. The intention is now to take stock and to carry out a strategic review following the outcome of this quality review.

### Programmes and Instruction

The School is involved in three distinct elements of instruction, namely undergraduate degree programmes, postgraduate training-by-research and external Short Course/Certificate/Diploma/Masters in an industry-specific area.

The BSc in Applied Physics is the flagship undergraduate programme. With its distinct emphasis on modern technology this course is highly valued by former and current students, as well as by employers. Despite the recent decline in enrolment it is clear that there is a cohort of students who will make this course their first choice. The PRG compliments the School on the introduction of the peer-tutor system and general student-centred efforts towards improving first-year retention rates. It supports the on-going review of the content of subsequent years of the programme and urges the development of team-based learning. The PRG shares the concern of the School that the INTRA 9 month industrial placement placements must be available to all qualified students. Equally, the PRG notes with concern the contrasting views of former and existing students in relation to laboratory equipment; what was formerly state-of-the-art is now showing its age. This denominated degree must project the modern face of technology. Finally, the PRG notes with interest the attachment of former students to the name "Applied Physics".

The BSc in Physics with French/German student cohort is relatively small and will be subsumed in a new Science International Programme. The BSc in Science Education

is a welcome initiative in the area of physics and chemistry teacher instruction. Service teaching in other programmes appears to be well received by students and their respective schools.

In summary, the general response from students is that undergraduate teaching is professional, the staff are "very approachable" and that the School is a student-centred unit. The PRG supports the School in their efforts to maintain this ethos, in, for example, the provision of a recognisable "common-space" within the School.

Postgraduate numbers account for approximately one-third of the FTSE of the School and seem likely to increase. Training-by-research is staff-intensive and somewhat informal; postgraduate students have expressed a wish for formal course content. The PRG believes that the School should move towards some formal course delivery, with certification linked to progression from Masters to Doctoral registration.

The third element of Instruction is "off-campus", being either on-site industrial training or web-based Certificate/Diploma/Masters. That the students are off-campus is something of a challenge to both the School and the University and the PRG supports efforts at both levels to accommodate these students administratively and to effectively market this programme.

The general infrastructure (lecture theatres & laboratories) is of a good standard but the central provision of audio-visual facilities could be improved. The PRG also notes that it is difficult for the School to include demonstrations in these central facilities. It is not clear to the PRG that the current system of graduate student demonstrating as an unpaid element of a studentship is sustainable.

In general conclusion, the PRG congratulates the School on its commitment to Instruction and on its efforts to refine and define new programmes which will attract extra students to the university.

### Scholarship and Research

The School is overall strongly 'research active', with highly motivated staff and excellent research facilities. The research is effectively organised in five groups (CLPR, PRL, OSL, SSL and SSRL) having complementary expertise. Some staff members pursue their research individually. There is a strong synergy between the research performed and the instruction and programmes, in particular the Applied Physics course. A high percentage of the academic staff is 'research active' and the group structure respects the traditional independence of individual staff. In the long term it would seem preferable to integrate researchers into fewer groups, thereby sharpening the research profile in a limited number of well-defined areas.

Research is strongly coupled to that performed in the National Research Centres for Plasma Science and Technology and for Sensor Research. This involvement in the Centres is clearly beneficial, not least for the encouragement of interdisciplinary research. That the School provides the leadership in the two Centres is evidence of its research profile within the University.

The School has benefited from major equipment donations and a good level of external research funding provides a solid experimental base. The School is aware of problems that may arise from deficiencies in the infrastructure, especially insufficient



technical support and the absence of career paths for research staff. These need to be eliminated in order to ensure a high level of research in the future.

The research output of the School, in terms of number of publications, is rated overall high. However, while it currently compares favourably on an Irish level, there is room for improvement on an international level. Again the PRG acknowledges the awareness of this fact within the School. A greater focus on publication in the higher impact journals is encouraged.

The number of postgraduate students should be increased, and the time to completion of theses should be reduced. Postgraduate students are the primary engine of improved research output; they will also compensate for falling undergraduate student numbers.

The long-term future development of the School should take into account that the School is a relatively small research unit and consequently resources are limited. Moreover, the current research areas are well chosen with potential for many further years. Perhaps modifying the existing areas in order to incorporate novel trends is a more appropriate way. On the other hand, it is apparent that theoretical physics does not have a strong presence. It would be beneficial for future developments to strengthen theoretical physics, particularly computational physics (numerical modelling and simulations) as an important ingredient of modern physics research and teaching.

### Social and Community Services

Members of the School are active in various initiatives such as access programmes for the disadvantaged, providing laboratory facilities for local second level schools, running the Physics Olympiad and participation in national committees and taskforces related to the physical sciences. The strongest area of School participation is in post primary schools liaison, however this is resource intensive.

### Staffing, Accommodation and Resources

#### *Staffing*

The senior: junior ratio for the School is about 47:53. One only of the senior staff is at full professorial level; three are at associate professor level, and three at senior lecturer level. However, the PRG believes that there should be more senior appointments based on the School's activities and the staff profile.

The ratio of academic staff (15) to technical support staff (5) is 3:1, IT support is provided locally. A secretary grade 2 provides local administrative support for the School whilst other secretarial support is in place for particular research centres. Research staff (24) are employed on contracts of not more than 1 year which represents a risk to the School. The current technical and administrative support will not be adequate to deal with future growth.

#### *Accommodation*

The 2420m<sup>2</sup> space available to the School is dedicated to academic activity and office accommodation and is adequate in general terms. However research staff are not adequately provided for with office space. The additional space that will be available to the research staff associated with the research centres will ease the pressures that now exist. A frequently expressed concern of research students and research staff is the lack of a common assembly area.

### *Resources*

Undergraduate laboratory equipment is ageing and becoming increasingly out of date. Students who came to DCU because of the image of an Institution ahead in technology are particularly critical in this regard. IT resources are adequate. The lack of 24/7 access is a major challenge for researchers.

## **5. Overall Analysis of Strengths, Weaknesses, Opportunities and Concerns**

### **Organisation and Management**

#### *Strengths*

- Team based management style
- Research centre participation and research grouping

#### *Weaknesses*

- Lack of comprehensive strategic plan

#### *Concerns*

- Lack of definition in the relationship between the centres and the School

### **Programmes and Instruction**

#### *Strengths*

- “Applied Physics” degree highly valued by students and employers

#### *Weaknesses*

- Student recruitment

#### *Opportunities*

- Web-based course delivery
- BSc in Science Education

#### *Concerns*

- Ageing teaching equipment
- Loss of experienced teachers to Research Centres

### **Scholarship and Research**

#### *Strengths*

- Well-organised group structure
- Synergy of research and teaching
- High percentage of research active staff

#### *Weaknesses*

- Percentage of papers in high impact journals not high enough
- Number of publications is below international level
- Number of post-graduate students is too low
- Two groups (SSL and SSRL) are comparatively small

#### *Opportunities*

- Strong equipment base
- National and European funding initiatives

### *Concerns*

- Technical support for highly complex technical equipment
- Promotion of research active staff
- Dominance of research institute ethos

### **Social and Community Services**

#### *Strengths*

- Schools Liaison Programme

### **Staffing, Accommodation and Resources**

#### *Strengths*

- Highly motivated staff with commendable level of activity in teaching and research
- High number of postdoctoral researchers
- Quality of accommodation

#### *Weaknesses*

- Lack of promotional opportunities for academic staff
- Low level of technical support
- Lack of locally managed assembly area for the School
- Ageing undergraduate teaching equipment

#### *Opportunities*

- New research centre building

#### *Concerns*

- Lack of career structure for researchers
- Current budget allocation process
- Declining student numbers
- Dependence on research funding for demonstrator support

## **6. Recommendations for Improvement**

### General

The work done by the School on the self-assessment exercise is excellent and provides the basis for a comprehensive strategic planning exercise.

We strongly recommend that the department consider what would be needed to move to the next level of quality as part of this Strategic Long Range Plan e.g. more senior positions including a professorship to drive strategic areas, new specialisms such as computational physics.

### Organisation and Management

1. Develop a comprehensive Strategic Long Range Plan based on the excellent self-assessment report developed for the Quality Assurance & Quality Improvement Programme and incorporating the recommendations of the PRG.
2. The Physics school must develop a clear and well-defined vision around the respective roles of the school and the large research centres (Plasma and Sensors).
3. This vision needs to be supported by a clear definition of roles and obligations regarding teaching, postgraduate supervision.
4. Strengthen technical support.
5. Continue to support the promotion of the Applied Physics degree under the existing title.

### Programmes and Instruction

1. The undergraduate laboratory equipment needs to be upgraded and modernised. Predictable budgets should be put in place to ensure that the equipment remains up-to-date.
2. More team-based learning should be introduced into the undergraduate curriculum.
3. The introduction of interdisciplinary programmes, though commendable, should be based on a better understanding of market needs.
4. The issue of declining undergraduate numbers needs to be tackled – perhaps using a university provided professional marketing approach supported by the School.
5. There should be some formal course delivery as part of postgraduate research degrees.

### Scholarship and Research

1. A structured approach is needed to attract increased numbers of high quality postgraduates.
2. The level of technical support must be increased in line with the increased complexity and volume of research activity.
3. The risk of losing technical expertise should be addressed by improving the length of contracts for full time postdoctoral and other researchers.
4. The time taken for the completion of postgraduate degrees needs to be reduced.

### Staffing Accommodation and Resources

1. There is a need to address the constraints currently imposed on quality and promotional opportunity by the 60:40 allocation ratio.
2. The provision of a common assembly area in the School for postgraduates and staff is essential.
3. The University needs to improve the customer orientation and efficiency of all central provided services to at least match the quality of service provided by Computer Services and the Library.
4. 24/7 access to the School should be provided for research personnel.

5. The 0.8 weighting of the School is anomalous. The weighting algorithms should be revisited to bring the School into line with other sciences.