

# PERIODIC REVIEW OF METEOROLOGY

## Reviewing programmes delivered by the Department of Meteorology within the School of Mathematical and Physical Sciences

### INTRODUCTION

- 1 An internal review of programmes in Meteorology was held on 12 and 13 November 2015. The members of the Panel were:
  - Dr David Carter, Teaching and Learning Dean (*Chair*)
  - Dr Miriam Byrne, Lecturer, School of Physics, NUI Galway (*external member, subject specialist*)
  - Dr Andrew Ross, Lecturer in Dynamical Meteorology, School of Earth and Environment, University of Leeds (*external member, subject specialist*)
  - Dr Alec Bennett, Meteorological Products Manager, Biral (*external member, industrial specialist*)
  - Mrs Christina Duckett, Deputy School Director of Teaching and Learning, School of Construction Management and Engineering (*internal member*)
  - Dr Emma Mayhew, School Director of Teaching and Learning, School of Politics, Economics and International Relations (*internal member*)
  - Ms Lauren Gest, Part 3 BA Law, University of Reading
  - Mr Richard Sandford, Quality Support Officer, Centre for Quality Support and Development (*Secretary*)
  
- 2 The Panel met the following:
  - Professor Simon Chandler-Wilde (*Current Head of School*)
  - Professor Ben Cosh (*Incoming Head of School*)
  - Dr Karen Ayres (*School Director of Teaching and Learning*)
  - Dr Bob Plant (*Former School Director of Teaching and Learning*)
  - Professor Giles Harrison (*Head of Department - External Affairs*)
  - Professor Eleanor Highwood (*Former Head of Department - Academic Staff*)
  - Dr Remi Tailleux (*Examinations Officer*)

- Dr Calvin Smith (*School Senior Tutor and Equality & Diversity Champion*)
  - Mr Ross Reynolds (*School Director of Internationalisation*),
  - Dr Andrew Charlton-Perez (*MSc Programme Director*)
  - Dr Thomas Frame (*MSc Admissions Tutor*)
  - Dr Pete Inness (*Undergraduate Programme Director and Admissions Tutor*)
  - Prof William Collins (*Professor of Atmospheric Chemistry and Earth System Modelling*)
  - Prof Danny Feltham (*Head of Department - Academic Staff and Professor of Climate Process Physics*)
  - Prof Suzanne Gray (*Professor of Meteorology*)
  - Dr Christine Chiu (*Associate Professor of Atmospheric Physics*)
  - Dr Christopher Scott (*Associate Professor in Space & Atmospheric Physics*)
  - Mr Stephen Gill (*Building and Facilities Manager*)
  - Mr Ian Read (*Teaching Development and Research Technician*)
  - Mrs Dawn Turner (*Executive Assistance to Head of School*)
  - Mrs Catherine Turner (*Librarian*)
  - Ms Linda Watson (*MSc Administrator for Mathematics and Meteorology*)
- 3 The Panel met students who represented the following degree programmes:
- BSc Environmental Physics
  - BSc Meteorology and Climate
  - MMet Meteorology and Climate with a Year in Oklahoma
  - MSc Applied Meteorology
  - MSc Atmosphere, Ocean and Climate
  - MSc Applied Meteorology and Climate with Management
- 4 The Panel met recent graduates who had graduated from the following degree programmes between 2008 and 2015:
- BSc Meteorology and Climate
  - BSc Meteorology and Climate with a year in Oklahoma
  - MSc Applied Meteorology
  - MSc Applied Meteorology and Climate with Management

## GENERAL OBSERVATIONS

- 5 The Review Panel met with a range of staff from across the Department, including teaching and learning staff, administrative staff and technicians. The staff were fully engaged with the process and made the Panel feel welcome. The review benefitted from a comprehensive and well-organised Blackboard organisation. The panel found the resources provided invaluable in their review of the Department's activities. The panel extends its thanks to the Department for its hospitality and full engagement with the process.

- 6 The Panel were grateful for the opportunity to meet and question current and former students. They found the students to be a credit to the Department and wish to thank them for their valuable input.
- 7 The Panel was impressed by the sense of identity that was felt within the Department. The sense of community and history within the Department was key to their success. It was noted that students felt that all staff were friendly and approachable, and that they benefitted from being able to interact with the large number of Research focused staff. The distinguishing characteristic of the Department is its strong academic ethos and a sense of collegiality and shared mission. This is demonstrated in:
- the use of space within the Meteorology building, especially shared space such as the Department library; however, it is recognised that this advantage can easily be lost as the Department grows **[advisable recommendation g]**;
  - the weekly Weather and Climate Discussion (WCD) which brings the whole staff and student body together to discuss live weather data. These discussions also provide an audience for general studies presentations by final-year undergraduates. The review team visited the WCD and was impressed with the unusually strong sense of academic community that it demonstrated **[good practice k]**.
- 8 Accordingly, when the Panel met with alumni they found that that the collegiate ethos of the Department had prepared them well for professional life.
- 9 The Department needs to take care, given the rapid expansion of its academic staff, to protect this academic culture. In particular, the Department needs to think about how to meet undergraduate recruitment targets in order to bring about large enough groups that undergraduates maintain a sense of cohort identity within a growing Department. Given that Reading already has a good share of the small home market for undergraduate Meteorology, it is suggested that the Department considers the development of new international partnerships including exchange agreements such as the one already in operation in Oklahoma **[desirable recommendation h]**.

## ACADEMIC STANDARDS OF THE PROGRAMMES

### Educational aims of the provision and the learning outcomes

- 10 The Panel felt that the programmes under review are well established and internationally highly regarded in the field. Whilst the new BSc Environmental Physics is a recent development, it was noted that it draws heavily on existing teaching and research expertise.
- 11 The Panel confirmed that the aims and intended learning outcomes of the programme are clear, and the learning outcomes are aligned to the aims. However, the panel does have some specific concerns about the differentiation between learning outcomes of co-taught level 6 and level 7 modules (final year BSc / MMet Meteorology) **[necessary recommendation a]**.
- 12 The Panel found the learning outcomes to be properly aligned with the QAA benchmark statement for Earth Science, Environmental Science and Environmental Studies. The Meteorology programmes are accredited for CMet status by the Royal Meteorological Society and so the programme contents are aligned with the national expectations for a degree in this area.

- 13 The Panel noted that the external examiners are consistently satisfied that aims and learning outcomes are attained.
- 14 The Panel felt that the programmes would benefit from a periodic reflection by the whole Department on the content and sequencing of modules, the mathematics pre-requisites for various modules, better inclusion of computing courses, and the formal inclusion of professional skills elements in teaching **[advisable recommendation f]**.
- 15 The Panel was pleased to note that the Department has demonstrated its awareness of market changes through the recent establishment of a Management stream for one of the MSc programmes, and that there is provision for a year-long industrial placement within the BSc Environmental Physics programme; these are positive developments. The exchange link with the University of Oklahoma, which provides for a one year transfer of students, is an extremely successful and valuable feature of the MMet programme **[good practice h]**.
- 16 Whilst internationalisation is not an explicit part of the aims and objectives of the programmes (with the exception of the year abroad in Oklahoma as part of the MMet programme) it was noted that the subject is very international in scope with topics and examples drawn from around the world. The Taught Postgraduate programmes in particular attract good numbers of overseas students and the academic and research community in the school is very international. This gives students a global perspective on their subject.

## Curricula and assessment

- 17 The Panel agreed that the Department offered a broad range of programmes, which cover a comprehensive and appropriate range of topics, delivered by academic staff that include many key players in their respective research fields.
- 18 The Panel noted that, within the Department, there is a plurality of approaches to the provision of feedback. Some use of standardised feedback forms, which may be adapted by module convenors, would add to the consistency of the student experience, guide colleagues in the provision of sufficient amounts of feedback, and allow for further clarification of marking criteria. Feedback forms may include sources of additional academic support, in an end section, which would work to reinforce student awareness **[advisable recommendation b]**.
- 19 The Panel was pleased to note that there is extremely high compliance with the University policy for feedback to students. However, some inconsistency in the quality of feedback offered has been identified. The perceived transparency of marking could be enhanced through the clear communication of marking criteria for each assignment **[advisable recommendation c]**.
- 20 The Panel felt that students would benefit from written articulation of the different expectations of level 4, 5, and 6 work against departmental assessment criteria for undergraduate programmes **[advisable recommendation d]**.
- 21 The Panel noted that both staff and students appreciated the centrally maintained coursework calendar **[good practice f]**.

## Use of student management information

- 22 The Panel was pleased to note that the Department makes good use of data from a range of sources (both local and external). Discussions at weekly staff meetings are informed by data collected locally (including module marks). Deeper analysis of data was included as part of a review of MSc module and project marks (using data from previous cohorts to calculate possible average marks across all possible module combinations in MSc programmes). The Department is mindful of external drivers and makes decisions about their portfolio when data has suggested that this is necessary.

- 23 The Panel noted that detailed consideration had been given to student feedback gathered via the NSS. It was felt that the huge swing in scores on 'Assessment and Feedback' could be attributed to the low number of responses, but the Department will work to ensure that students are aware when work has been returned to them before the 15 day turnaround deadline **[good practice i]**.
- 24 Similarly, data from PTES had been considered and analysed and found to be favourable when compared to the sector, except in the areas of workload and fairness in assessment and marking. Feedback from the survey has informed the review of the MTMG05 module, in order to meet a perceived need for more support in scientific writing skills. The comments from external examiners (and their interactions with students) have also informed changes in the Department.
- 25 The Panel was interested to hear how data from the DeLHE survey's has helped inform the School's recruitment strategy. Statistics from DeLHE have indicated that further study is a key employment route for graduates from the Department and they have highlighted this to their potential new students.

## QUALITY OF LEARNING OPPORTUNITIES OFFERED BY THE PROGRAMMES

### Teaching and learning

- 26 The Panel noted the positive effect on teaching and learning engendered by the considerable effort made by staff to foster a sense of community. The creation and maintenance of central social spaces (including the coffee area and the library) was felt to be key to this. Such social spaces help facilitate interaction between students, staff and researchers outside of the classroom setting.
- 27 The Panel noted a broad range of internal T&L CPD activities and the degree of staff engagement with these.
- 28 The Panel noted that the Department is considering sending 'aspirational' emails to final year students at the start of the Autumn term outlining the average needed to achieve a higher classification than previous performance suggests. This mirrors the practice adopted by Mathematics and Statistics.
- 29 The Panel was impressed with the field trip opportunities open to students. Currently the 'Experiencing the Weather' module offers postgraduate students the opportunity to attend a field trip to Dorset and an optional final year module gives undergraduates the opportunity of attending a week-long trip in Arran. These field courses help students develop team-working and report writing skills **[good practice b]**.
- 30 The Panel felt that the creation of a Department of Computer Science within the School of Mathematical and Physical Sciences presents significant opportunities for cross-disciplinary programmes. The University is encouraged to investigate these opportunities, especially in the area of Big Data **[desirable recommendation j]**.

### Student admission and progression

- 31 The Panel felt that in terms of undergraduate Admissions, there is an appropriate distinction between the requirements of different programmes. The tariffs appear well-considered and sound, including the requirements for achievement in Maths and Physics at A2. The Panel found the requirements to be in line with competitors. The Panel felt that there might be scope to

- improve the clarity and consistency of communication regarding entrance requirements, offer making, and transfer between undergraduate programmes.
- 32 The Panel saw the Undergraduate recruitment target of around 30 students to be important in terms of maintaining the positive student experience. The Department has a strong reputation, in part owing to its collegiate atmosphere. The limited pool of home and EU applicants in the subject area means that the Department currently dominates the market.
- 33 Whilst the Home and EU market seems to be at capacity it was noted that there may be room for further growth in overseas undergraduates. The Department has a strong history of international recruitment to its postgraduate programmes and could benefit by exploring further international partnerships as a way to develop undergraduate recruitment pipelines and enhance the student experience at all levels.
- 34 The Panel recognised that there are a limited number of employment opportunities in Meteorology within the UK, but was pleased to hear about the success of past students and the strong retention rate of undergraduates to postgraduate study.
- 35 The Panel noted that the Department had put considerable effort into building a brand for the BSc Environmental Physics programme and marketing it amongst local schools and elsewhere. The Panel felt that the Environmental Physics brand should be supported and embedded, with support from central University services as appropriate. The Panel recognised that the recent introduction of the BSc Environmental Physics programme is part of a strategy to develop the teaching culture of the Department. **[advisable recommendation e]**.
- 36 One of the benefits of the BSc Environmental Physics programme is that it allows for a full year in industry. It was felt that further 'year in industry' options for Meteorology programmes might have benefits for student recruitment, and that the Department might want to explore this possibility.
- 37 The Panel believes that laboratory equipment and spaces at competitor institutions might make more of an impression on potential new students. Further investment in laboratory equipment and spaces would be beneficial. **[desirable recommendation i]**.
- 38 The Panel was satisfied that there were no particular issues in terms of progression or retention. As noted above, student support in mathematics may be worthy of further attention, and any review of the curricula should give consideration to how professional and transferable skills are developed over the duration of each programme. **[advisable recommendation f]**.

## Learning resources

- 39 The Panel recognised the important role played by support staff within the Department. The administrative and technical support staff are an important part of the teaching and learning team.
- 40 The Panel was impressed by the learning resources available to students. In particular, the recent investments in the Reading University Atmospheric Observatory have created an enviable facility for field teaching of meteorology (as well as research and outreach) **[good practice c]**.
- 41 The laboratories are also an invaluable space for hands-on teaching of students. While there has been investment in new experimental facilities in the laboratory in recent years (particularly aligned with the Environmental Physics programme), some of the equipment and facilities are becoming aged and will need refurbishment/replacement over the next few years.
- 42 The Panel heard how current shortages of technician time are putting some teaching activity under strain.

- 43 The Panel noted that students value the library and study space within the Department. These spaces provide them with a space to work within the Department and are important in terms of fostering a sense of belonging and collegiality **[good practice a]**.
- 44 The Department houses the Sutcliffe Lecture theatre (with a capacity of 100) which is used for lectures, departmental seminars (every Monday) lunchtime seminars (every Tuesday) and the weekly Weather and Climate Discussion (every Friday). These events are extremely well-attended, in part, owing to the proximity of the venue.
- 45 The spaces of the Meteorology Department are key to its identity and sense of collegiality. Although the Department's staff are currently spread across three different sites there is a significant benefit to having a central hub where all staff and students can meet.
- 46 The Panel felt that the shared spaces played an important role in the support of students. In particular the diverse backgrounds of students on the postgraduate courses means that there is significant peer support available to them to aid their transition through core programme modules. This transition is also aided by additional online support, meetings with personal tutors and access to the Programme Director. The provision of weekly personal tutorials at postgraduate level is seen as good practice **[good practice g]**.

## Employer engagement

- 47 The Panel noted that the Department has developed several initiatives following the 2010 review to increase the exposure of students to employers of meteorologists. The introduction of a tailored careers event and involvement of industrial partners to undergraduate and postgraduate projects are examples of these innovations **[good practice d]**. These events have been well received by both parties and represent a significant enhancement of their undergraduate and postgraduate offering. The inclusion of a year-long industrial placement in their newly created BSc Environmental Physics further demonstrates the Department's increased drive for employer engagement to the benefit of the students.
- 48 The MSc Applied Meteorology and Climate with Management course combines meteorological and management training, and was developed in response to feedback from employers such as the UK Met Office and other national meteorological services via the World Meteorological Organisation. The five day training course on the use of the UK Met Office's climate prediction "package" is included on this course, offering direct contact to the largest employer of meteorologists in the UK.
- 49 The Department has strong links with national and international bodies. This means that students have the opportunity to visit the UK Met Office and European Centre for Medium Range Weather Forecasts through organised visits.
- 50 The Panel felt that the students benefitted greatly from the opportunity to informally interact with teaching staff and researchers in the shared spaces. In discussions with alumni it became clear that they felt that such interactions were key to developing their professional skills, from early in their course. This development was aided by the friendly and approachable culture fostered within the Department. It is therefore important that such an environment should be preserved.

## ENHANCEMENT OF QUALITY AND ACADEMIC PROVISION

- 51 The Panel noted that the Department uses a variety of mechanisms to facilitate the enhancement of the quality of its provision. As well as institution-led mechanisms they use more

informal routes to gather feedback and lay groundwork for discussions at the formal activities. For example, ahead of the Staff Student Liaison Committee meeting they hold a Departmental Forum where student representatives meet academics to discuss any issues with modules and programmes. Responses to these issues are gathered ahead of the SSLC meetings and inform the discussions at those meetings.

- 52 The Panel was particularly impressed by the way the module convenors give responses (often in some detail) in the body of Staff-Student Liaison Committee minutes.
- 53 The Panel was interested to hear about the Department's use of module supporters who act as second markers for exams or continuous assessment. The Panel felt that this model provided academic colleagues with a kind of peer review which could only enhance the quality of academic provision **[good practice j]**.
- 54 The Panel noted that the Department had held two teaching development workshops in the summer of 2015. The workshops identified eight areas where improvements could be made in order to enhance the development of key skills for students on undergraduate programmes. The workshops also delivered a timeline for the delivery of these enhancement activities. The areas that the Department was reviewing were as follows:
- improving the computing skills (especially in the Python programming language) amongst students to meet expectations of external organisations;
  - introducing students to key concepts in scientific method, including problem solving, orders of magnitude, estimation techniques and the history and philosophy of meteorology;
  - developing scientific writing skills before students embark upon the final-year project;
  - ensuring that mathematics and statistics work covered in part 1 is seen to be relevant to the study of meteorology and climate;
  - giving students the opportunity to familiarise themselves with complex computing models (such as the Open Integrated Forecasting System, as used by the European Centre for Medium-Range Weather Forecasting);
  - investigating the possibility of modifying some undergraduate and taught postgraduate programmes to satisfy the World Meteorological Organisations BIP-M requirement;
  - building upon successes around the promptness of feedback at taught postgraduate level in order to deliver feedback which is perceived to be more 'fair' and transferring these successes to undergraduate feedback;
  - ensuring wider representation of students on Staff Student Liaison Committees and Staff Student Forums.
- 55 The Department has shown a commitment to staff development through both general (ie internal) activities and engagement with University-led initiatives. Internal arrangements included the annual CPD session for Personal Tutors (arranged by the Senior Tutor), peer review of teaching (arranged by the School Director for Teaching and Learning with input from the Head of Department for Academic Staff) and a programme of general CPD events.
- 56 Two senior members of staff have recently achieved Senior Fellow status of the Higher Education Academy and others are working towards recognition via the FLAIR Academic Practice Programme (APP) and CPD routes. In order to help new staff complete the APP they are given reduced teaching and administration loads. Senior staff have exhibited a willingness to mentor colleagues through the FLAIR scheme.
- 57 The Panel was impressed by the Department's commitment to diversity and inclusion, as exhibited by its Athena SWAN accreditation, and the appointment within the Department of an Athena SWAN and School Equality and Diversity Champion **[good practice e]**.



# MAIN CHARACTERISTICS OF THE PROGRAMMES UNDER REVIEW

58 Notwithstanding its strengths in research, teaching and learning is of vital importance to the culture and standing of Meteorology at Reading. The Department delivers a broad, current and relevant curriculum at undergraduate and postgraduate level, which is fully up to date with research and a strong collegiate ethos. Students learn valuable professional skills through their interactions with teaching and research staff.

## CONCLUSIONS ON INNOVATION AND GOOD PRACTICE

59 The Panel identified the following as representing particularly good practice:

- a) The Panel commended the Department's use of space to help foster a sense of community and engender a spirit of collegiality amongst staff and students. The Department's social spaces act as a hub for students and teaching and research staff.
- b) Field trips to Arran and Dorset were seen as a great opportunity for students to develop their team-working skills. The trips also afforded the opportunity to practice report-writing and maintain field books/logs. The trips were greatly valued by students and also provided further opportunity for strengthening the collegiate feel of the Department.
- c) The Panel felt that the Reading University Atmospheric Observatory was an enviable facility and gave the Department a distinct advantage over its competitors. Its importance to teaching and research was evident.
- d) Undergraduate engagement with industrial partners occurs at three key stages – through the careers event, poster presentations and undergraduate projects. Students create networks and contacts via the first, showcase their research and interests via the second and some end up doing project work with those partners. Some MSc projects are co-supervised by an industrial partner with the projects undertaken having direct real-world relevance to those partners.
- e) The Panel noted a deep-seated commitment to diversity and inclusion. The commitment was also evident in the student body, who supported the Athena SWAN activities through participation in working groups. A further example of the commitment is the additional lengths undertaken by the Department to support a deaf student whilst on the Arran field trip (with both staff and students acting as note-taker at various points).
- f) The School centrally maintains a coursework calendar of all work that is due to be submitted. Details are collected at the beginning of each term and added to a coursework calendar which is then uploaded to the Blackboard Portal for all students to access. Both students and staff have reported this to be a useful resource.
- g) Taught Postgraduate students have access to staff at weekly tutor groups and bi-weekly cake and coffee meetings. The programme director operates an open door policy. The School has also recently implemented weekly maths tutorials which are open only to Meteorology students. These regular (and sometimes informal) meetings give students a great opportunity to keep track of their performance and raise any issues.
- h) The Panel recognised the huge benefits of the partnership with Oklahoma University. The students were extremely enthusiastic about their experience at Oklahoma and returned motivated to succeed in their final year. The opportunity to transfer to the Oklahoma programme was also a driver to perform well for students who had been admitted to Reading on courses other than the MMet.

- i) The Department was delivering feedback well within the 15 day turnaround time limit and was investigating ways in which to highlight this to their students. There has been a rise in the NSS against the question relating to promptness of feedback (from 64% to 69% from 2014 to 2015), and a huge rise in the PTES (from 30% to 90%).
- j) All modules are allocated a 'module supporter' to act as first checker of coursework and examination scripts. This is seen as invaluable to new staff and those teaching new modules. The allocation of module supporters means that there are three levels of scrutiny for assessed work. The Panel felt that this system exemplified a culture of peer review and support that ran through many of the Department's activities.
- k) The Panel commended the weekly Weather and Climate Discussion for its ability to draw together nearly 100 members of the Department, at all levels, to discuss live weather data and final year presentations. It is characterised by a friendly and yet critical atmosphere of inquiry and shared endeavour.

## CONCLUSIONS ON QUALITY AND STANDARDS

- 60 The Panel has concluded that the quality and standards of the programmes reviewed are appropriate. It has noted that there should be greater clarity around the outcomes and assessment regimes of level 4 modules taken by students on the MMet Meteorology with a year in Oklahoma.

## CONCLUSIONS ON NEW DEGREE PROGRAMME PROPOSALS

- 61 The Panel received no submissions with regards to new programme proposals.

## RECOMMENDATIONS

- 62 The Panel recommends to the Joint Faculty Board for Teaching and Learning for Sciences and Life Sciences that the following degree programmes taught by the Department of Meteorology should be re-approved to run for a further six years:
- BSc Environmental Physics
  - BSc Environmental Physics (with placement year)
  - BSc Meteorology and Climate
  - BSc Mathematics and Meteorology
  - BSc Mathematics and Meteorology with a Placement Year
  - MMet Meteorology and Climate with a Year in Oklahoma MMath Mathematics and Meteorology
  - MMath Mathematics and Meteorology with a Placement Year
  - MSc/PGDip Applied Meteorology
  - MSc Applied Meteorology and Climate with Management
  - MSc Atmosphere, Ocean and Climate

- MSc Data Assimilation and Inverse Modelling in Geoscience (until the final student graduates)
- 63 The report will categorise any issues as follows, in order of priority:
- Those areas where the Review Team believes it is **necessary** for action to be taken urgently to safeguard the standard of provision;
  - Those areas where it is **advisable** that the issues be addressed as soon as possible;
  - Those areas where it is **desirable** that the issue be addressed over a longer time span.
- 64 The Panel has made the following recommendations which must be addressed as a condition of re-approval:

### **Necessary**

- a. Review the learning outcomes and assessment regimes of all part 4 modules so that there is better articulation of the opportunities students have to meet master's level outcomes

### **The Panel makes the following recommendations to the Department:**

#### **Advisable**

- b. Implement a department-wide policy on the provision of feedback on student work. This policy should be exemplified through consistent use of feedback forms that reference the marking criteria and identify areas for improvement
- c. Ensure the clear and timely communication of marking criteria for each assignment, so that students have the opportunity to understand what constitutes excellent work
- d. Articulate in writing the different expectations of level 4, 5, and 6 work against the departmental assessment criteria for undergraduate programmes
- e. Work with central University services to develop and embed the brand of the BSc Environmental Physics
- f. Take a more strategic overview of undergraduate and postgraduate programme aims and outcomes, in particular to include:
  - i. Reflection on the development of transferable and professional skills throughout programmes and through extra-curricular activity;
  - ii. A review of the development of programming and data analysis skills within programmes ; and
  - iii. A review of opportunities to connect the teaching of mathematical skills and concepts to meteorological applications in the undergraduate curriculum from part 1 onwards
- g. Plan carefully ahead to ensure that constraints of space do not adversely impact on the changing academic culture of a growing department

#### **Desirable**

- h. Develop a strategy for further international partnerships as a way to meet current recruitment targets for the undergraduate student body and enhance the student experience at all levels

The Panel also makes the following recommendations to the **University**:

**Desirable**

- i. Consider Meteorology's space and equipment needs in the context of a competitive student recruitment market
  - j. Investigate the opportunities presented by the creation of a Department of Computer Science within the School of Mathematical and Physical Sciences, and in particular the possibility of new cross-disciplinary programmes in Big Data
- 65 The Panel does not have a recommendation to the Faculty Board for Teaching and Learning for the Sciences and Life Sciences as to whether any proposal(s) for new degree programmes should be approved, as this is not applicable.