



## **Welcoming Remarks to M.Sc. Students Monday, 7th September, 2009.**

**Prof Peter Lynch**

**Graduate Room (Room 125)**

School of Mathematical Sciences

Science Education & Research Centre (SERC-North)

University College Dublin

Belfield, Dublin 4.

### **Welcome.**

It is my great pleasure to welcome you all here to University College Dublin for the start of the 2009-2010 MSc Course in Meteorology. This is the *sixth* year in which this university course, devoted exclusively to meteorology, is being presented. The first five years have been very successful. There were nine full-time students for the first year, eight for the second, ten for the third, seven for the fourth and eight for the fifth. This year, there are no fewer than twelve students in the programme. I am delighted to tell you that almost all students to date have been successful in completing the course.

Meteorology, the study of the atmosphere, has been an active area of science for hundreds of years. But interest in meteorology has never been keener than it is today. The primary reason for this is the threat of significant changes in the Earth's climate. Some learned people have described this as *the greatest threat facing humanity today*. The IPCC Fourth Assessment Report issued in 2007 has clearly identified human activities as a cause of climate change, and great challenges face us in tackling this issue.

The weather has an impact on almost all areas of our lives. Some people are interested in the weather conditions for their occupations, others with how

much sunshine they will have for their holidays, and others still have more serious preoccupations about whether they will have a home tomorrow. You are all aware of the problems associated with flooding in Ireland over the past three Summers: 2009 was the wettest Summer on record at Valentia Observatory. Weather is a serious business. So, it is vital for us to understand the dynamics of the atmosphere and ocean in order to anticipate extreme events and to prevent catastrophic changes in the climate. This Masters Course is an important step in the development of atmospheric science in Ireland.

### **Background.**

Up until very recently, there has been a serious deficiency in meteorological education in Ireland. There was essentially no study of atmospheric dynamics, or of synoptic meteorology or numerical weather prediction. In this respect, we contrasted unfavourably with virtually every other country in Europe; in most western European countries, there are Departments of Meteorology in several universities; in the United States, about seventy universities have major programs in atmospheric science.

The National Meteorological Service, Met Éireann, recognized this lack and, several years ago, initiated discussions with a number of universities with a view to establishing courses in meteorology and enhancing research in atmospheric science. The upshot of these negotiations was that a *Memorandum of Understanding* (MoU) was signed by Met Éireann and UCD in October 2003. This proposed the setting up of a Meteorology and Climate Centre, and a Masters Course in Meteorology. It is this very course that you are about to undertake.

### **Recent Developments at UCD.**

The Meteorology and Climate Centre is within the School of Mathematical Sciences. The School, in turn, is a school within the College of Engineering, Mathematics and Physical Sciences. The meteorology course will be in the *School of Mathematical Sciences*.

A professor of meteorology was appointed in June, 2004, the *Met Éireann Professor of Meteorology* and he took up office on 1<sup>st</sup> September, 2004. Prof Ray Bates also took up office, as Adjunct Professor, having recently retired as Professor of Meteorology in the University of Copenhagen. And a Lecturer in Meteorology, Dr Rodrigo Caballero, joined the School in September 2005.

The activity here is being undertaken in close collaboration with Met Éireann. There is an Advisory Board for Meteorology to oversee the work, and Met Éireann is represented on that Board. We now also have a supply of real-time meteorological guidance for weather analysis and study, provided by Met Éireann. Some of this is shown on our meteorological visualization system, *MetVue*.

A new undergraduate programme *Climate and Earth System Science* (DN038) started in 2007, and we will be teaching modules, *Introduction to Meteorology and Climate* and *Foundations of Climate Science* to First Year and Second Year students in that programme. The third year students in this programme will share some classes (although not modules) with you.

Another area of collaboration with Met Éireann is the *Community Climate Change Consortium for Ireland* (the C4I Project), the aim of which is to model and predict climate change in Ireland. We have a programme for Ph.D. students, and we have four postgraduate students, Paul Nolan, Colm Clancy, John Hanley and Jen Courtney. We also have three Post-doctoral researchers, Shiyu Wang, Conor Sweeney and Nazario Tartaglione. We are continuing to develop a cohesive programme of research in meteorology and climate modelling.

### **Details of the Masters Course.**

The course is modular, and may be taken on either a full time or part time basis. The majority of students opt for full time study.

The university operates a semester system. The first semester runs from September 7<sup>th</sup> to November 27<sup>th</sup>, lasting 12 weeks. The second semester starts on January 18<sup>th</sup> and runs (over 7+5 weeks with a two-week break) to 23<sup>rd</sup> April. Thus, there are two twelve-week semesters.

The M.Sc. lecture courses will comprise six separate taught modules. They will cover the following areas:

- (1) Physical Meteorology (Dr Rodrigo Caballero)
- (2) Dynamical Meteorology (Prof Ray Bates)
- (3) Climate Dynamics (Dr Rodrigo Caballero)
- (4) Numerical Weather Prediction (Prof Peter Lynch)
- (5) Synoptic Meteorology I (Prof Peter Lynch)
- (6) Synoptic Meteorology II (Prof Peter Lynch)

Physical Meteorology, Dynamical Meteorology and Synoptic Meteorology I will be taught in the first semester. Climate Dynamics, Numerical Weather Prediction and Synoptic Meteorology II will be taught in the second.

Part time students may opt to take either of the following combinations in each year:

- (A) Physical in 1st Semester and Climate in 2nd Semester.
- or
- (B) Dynamic in 1st semester and Numerical in 2nd Semester.

They may take Synoptic Meteorology I and II in either the first or second year, or one in each year.. Other combinations may not be possible, as the Climate module will depend on the Physical one, and the Numerical on the Dynamical. Part time students should discuss their options with me.

### ***Timetable***

Lectures will be each morning, Monday to Friday and on Tuesday and Thursday afternoons. A timetable is annexed to this document.

### ***Textbooks***

The primary text for the Dynamic Meteorology module is Holton's "**Introduction to Dynamic Meteorology**" (4th Edn). Students are REQUIRED to have a copy of this text. There should be copies of this text (price about €60) available in the Campus Bookshop.

The text on which the Physical Meteorology module is based is "**Atmospheric Science: An Introductory Survey**", by J M Wallace and P V Hobbs, Second Edition (2006). This is a REQUIRED text.

The text for the course in Numerical Weather Prediction is "**Atmospheric Modeling, Data Assimilation and Predictability**" by Eugenia Kalnay, published in 2003 by Cambridge. This is a REQUIRED text.

Texts for the modules in Climate Dynamics and Synoptic Meteorology will be given at a later stage. Some notes will be provided for all modules. However, it is essential that you build up your own sets of notes based on the lectures and practical sessions.

### ***Synoptic Meteorology Sessions***

The Synoptic Meteorology modules will overlap with the two modules Weather Analysis & Forecasting I and II, which are Stage 3 modules in the Climate and Earth System Science programme. However, you will have three hours of Synoptic Meteorology per week (whereas the undergraduates will have two). On Friday mornings there will generally be a (shared) lecture from 10:00am to 10:50, a break, and then a Weather Analysis session involving application of theory, current weather or analysis of historical cases.

### ***Afternoon Sessions***

The Thursday afternoon “Laboratory” Sessions will vary in nature. They will include tutorials, supplementary lectures, assigned exercises, special seminars and student presentations. All students are expected to participate in these sessions. Part time students must participate in 50% of the Laboratory Sessions, with students from the two alternate streams participating in alternate weeks. We are anxious to have feedback from students about the best way of arranging these sessions, so let us have your views.

### ***Research Thesis***

Students will be required to undertake a research project over a ten-week period in the Summer months, and to write up the results in the form of a thesis. Thesis projects will be assigned by agreement, and each student will report regularly to a supervisor. Research work for the projects will be undertaken over a dedicated period of about ten weeks, from early June until mid-August (exact dates will be given later). Please note that, this year, the research projects will count for 30 ECTS credits, one third of the total credits for the course, so it is essential to start planning and working on your projects early in the academic year.

The project reports are typically about fifty to one hundred pages in length. Previous reports are available on our website. It is important for you to bear in mind that they are *formally assessed*, and count towards your final marks.

### ***Field Excursions***

On 2<sup>nd</sup> October there will be a Field Excursion to Valentia Observatory, the Met Éireann main Geophysical Observatory in Caherciveen, Co Kerry. In view of the distance, it will be necessary to travel to Kerry on Thursday, 1<sup>st</sup> October. There will be lectures and presentations at the Observatory, and

students will be able to witness a radiosonde launch and learn about the geomagnetic and seismological work in addition to the meteorological programme of the Observatory. All students are expected to participate in the Field Excursion.

Last year, for the first time, we arranged for another Field Trip, to Leeson House Field Studies Centre in Langton Maltravers, Dorset. If this can be arranged again in 2009, you will be joining the Masters students from Reading University for a two-day programme of observation and weather analysis there. Students must bear their own travel and accommodation expenses for the Field Excursions. Further details about it will be given to you as soon as they are available.

### ***Examinations***

Most modules will be taught over a single semester, and will be examined at the end of the semester. Thus, there will be two examinations in December (in Physical, Dynamical and Synoptic Meteorology I) and three in May (in Climate Dynamics, Numerical Weather Prediction (NWP) and Synoptic Meteorology II). The thesis will also be assessed and a mark awarded.

The allocation of marks will be as follows:

<b>MODULE</b>	<b>MARKS</b>
Physical Meteorology	100
Dynamical Meteorology	100
Climate Dynamics	100
Numerical Weather Prediction	100
Synoptic Meteorology I	100
Synoptic Meteorology II	100
Research Thesis	300
<b>Total marks</b>	<b>900</b>

The Grade Point Average, which has been introduced at UCD , is computed by an aggregation of the grades obtained in all the modules. The final aggregate result of assessments for each student registered to a module is returned as a single letter grade according to the following scheme:

GRADE	GRADE-POINT	DESCRIPTION
A+	4.2	Excellent
A	4	
A-	3.8	
B	3.6	Very Good
B	3.4	
B	3.2	
C	3	Good
C	2.8	
C	2.6	
D	2.4	Acceptable
D	2.2	
D	2	
E	1.8	Marginal Fail, <i>may compensate</i>
F	0	Fail

Honours for **modules** are awarded based on the following marking levels:

First Class Honours	Grade A	$\geq 70\%$
Second Honours, Grade 1	Grade B	$\geq 60\%$
Second Honours, Grade 2	Grade C	$\geq 50\%$
Pass	Grade D	$\geq 40\%$
Fail	Grade F	$< 40\%$

To be eligible for award of an M.Sc., *students must obtain a pass grade (Grade D or better, directly or by compensation) for each of the modules and also for the thesis.*

*Warning:* Marks for *repeat* examinations will be capped at 40% (Grade Point 2).

#### ***A Miscellany of other issues***

*Seminars* on meteorological topics are arranged within the School of Mathematical Sciences through the academic year. All M.Sc. students are expected to attend these seminars. They are part of your education!

The *Irish Meteorological Society* is open to all interested in meteorology, which (I sincerely hope) includes all of you. The society arranges occasional lectures through the winter months [<http://www.irishmetsociety.org/>]

If you have difficulties with mathematics, there is a newly-established *Mathematics Support Centre*. The centre caters primarily for first-year students, but all are welcome to visit the centre and seek assistance for any mathematical problems they may have. The Centre is located on the ground floor of the Science Centre Hub, which makes it very convenient for you. The Director is Nuala Curley. I encourage you to drop in and talk to the staff there.

### ***Automatic Weather Station***

We have acquired equipment for an Automatic Weather Station (AWS), and it has been set up on a site within the Belfield campus. Initial data from the AWS has been checked and quality-controlled. However, much remains to be done. There are many exciting possibilities for projects either maintaining and developing the AWS or analyzing the data provided by it. We will discuss this with you soon.

### ***Concluding Remarks***

The Meteorology Masters Programme at UCD is a relatively new venture in meteorology in Ireland, one that holds great promise for the future and should bring substantial benefits to the university, the National Meteorological Service and the country as a whole. I hope you find it a rewarding and enjoyable experience. Its ultimate success depends very much on your efforts. I wish you all the very best of luck and sincerely hope you enjoy the year.

A handwritten signature in dark ink, appearing to read "Peter Lynch". The signature is fluid and cursive, with a large initial "P" and a long, sweeping underline.