Candidate Identifier Number:_____

UCL Language Centre In-Sessional EAP Course

Spring Term 2003 (Revised new format Spring 2005)

Listening Examination: Lecture *Time allowed approx.50 minutes*

RAIN

Before the lecture begins you will have 10 minutes to read this document. During the lecture you should complete the questions according to the instructions given. After the lecture you will have 10 minutes to check through the answers.

Please note that no questions will be asked during the introduction.

INTRODUCTION: No questions

I A definition of rainfall and some rainfall statistics

1. Complete the gaps.

It is accepted that 'heavy rain' falls at a rate of _____ mm per hour or more;

'light rain' at less than _____ mm per hour and 'moderate rain' between the two. (2)

2. Link the kind of rain on the left with the correct description on the right : →

Shower	breaks less than 10 minutes in an hour
Continuous rain	stops quickly and is followed by a clear sky
Intermittent rain	breaks longer than 10 minutes in an hour (3)

3. Weather records in the UK have been kept for: Circle one answer

a) over three hundred years b) over four hundred years c) since the 1990s (1.5)

4. Since 1997, which of the following has **not** happened? Circle one answer

a) plants grow for one month longer each year

b) there is less frost and snow in winter

c) winters have become drier and summers wetter (1.5)

5. The rain in the UK is now more like the rain in tropical areas. Circle one answer

True **False** (1)

6. Why does the lecturer say her feet are often wet? Circle one answer.

a) her shoes are not waterproof

b) her wardrobe has changed

c) the rain is heavier (1.5)

7. Complete the column **'Time'** in the table with information from the lecture:

Information required	**Time**	**Weather conditions**
Year – year *(eg 2005-2006)*		Wettest 12 month period ever recorded in UK
Month – year *(eg Sep 2005)*		Twice the average rainfall
Months – year *(eg May-Aug 2005)*		The rainiest autumn
Month- year		One week's continuous heavy rain in the south of England

(4)

8 Complete the gaps

According to the Meteorological office, in November 1970 there was161mm of rain in the southeast and _____ mm over the southwest. The figures for November 2002 are 183mm and _____mm respectively. December 2002 had a total rainfall of 131mm which was _____% of the 1961-1990 average. (3)

II The historical impact of technology in controlling the effects of rain in the UK.

9. In the past, rain often caused which two of the following. Circle **two** answers:

A trip a cold a twisted ankle severe illness (1)

10. The lecturer mentions a novel by **Jane Austen**: Which one? Circle one answer.

a) Pride and Prejudice

b) Sense and Sensibility

c) Mansfield Park

d) Emma (2)

11. How is the Scot 's name spelled? Circle one answer.

a) McAdam

b) MacAdam

c) McAdan

d) MacAdan (2)

12. Why were some roads in the 18th Century impassable in winter?
Write **C** in the box for the **Cause** or **E** for the **effect**.

a) they were muddy ☐

b) they were one or two kilometres wide ☐

c) they were full of holes ☐

(3)

13. Put the following statements about macadamized roads in the correct **chronological** order (write 1-4 in the boxes)

a) they had a great effect on travel ☐

b) they could be used all year round ☐

c) they had a smooth, hard surface ☐

d) they improved trade ☐

(4)

14. What is another word for a *macintosh*?

_____ (1)

15. What material did MacIntosh use to make his clothing waterproof? Circle one answer.

oil rubber wool (1.5)

16. What was the significance of the date 1823?

_____ (2)

17. The lecturer mentions three technological developments: What is the third?

a) all-weather roads

b) waterproof clothing

c) _____ (2)

18. What was the title of Like Howard's book? Complete the gap.

'On the _____ of clouds.' (1)

19. When was this book published? Circle one answer.

1832 1802 (1)

20. Name one place, according to the lecturer, where can you see Constable's paintings in the UK.

_____ (2)

III: What is rain? How does it work?

21. What is vapour? Circle the correct answer

a) air from the Atlantic Ocean

b) steam or evaporated water

c) air from the kitchen (1.5)

22. Circle **2** examples of vapour:

frost fog smoke mist (1)

23. How do showers form? Circle the correct answer:

a) vapour rises, mixes with hot air and forms clouds

b) vapour rises, mixes with cold air and forms clouds

c) vapour rises, mixes with cold air and forms ice (1.5)

24. Orographic rainfall is rainfall caused by warm dry air being forced up over mountain ranges and meeting cold air. Circle the correct answer.

True **False** (1)

25. Circle **3 areas** of the UK where the orographic effect is strong:

Eastern England | Wales | the Cotswolds

the Highlands of Scotland | the Lowlands of Scotland | Lake District (3)

26. Which area of the UK is wetter. Circle one:

West | East (1)

27. What are **2** differences between frontal systems and showers/orographic rainfall?

a. _____

b. _____ (2)

28. Where does cold air from the North Pole meet warm air from the Equator?
Circle the correct answer.

a) a line somewhere in the middle of the southern hemisphere

b) a line somewhere in the middle of the northern hemisphere

c) a line somewhere in the middle of the western hemisphere (1.5)

29. How long can the arrowhead ↑ of warm air be?

_____ to _____ kilometres long. (2)

30. Why is the air in the UK full of water vapour?
Circle the correct answer.

a) because it crosses the Atlantic Ocean

b) because it crosses the Arctic Ocean

c) because it crosses the Antarctic Ocean (1.5)

31. Use the arrows to connect the season with the time of day to explain Britain's variable weather.

	Season		Time of Day
Eg	Winter	→	morning
	Spring		lunchtime
	Summer		afternoon
	Autumn		go to bed

(3)

32. When were the causes of rain better understood?
Circle the correct answer.

a) 100 years ago

b) 70/80 years ago

c) 30 years ago (1.5)

IV: Global warming and rain

33. Global warming is a process where the temperature of the earth and air is increasing.
Circle the correct answer,

True **False** (1)

34. Do all scientists believe the cause of global warming is increased levels of carbon dioxide?
Circle the correct answer.

Yes **No** (1)

35. Name **one** of the 3 effects of global warming

_____ (2)

36. According to the lecturer, which continent is currently experiencing severe drought?
Circle one.

a) Asia b) Africa c) Australasia (1.5)

37. When was it first accepted that the global climate is becoming warmer?
Circle the correct answer.

a) 1968

b) 1978

c) 1988 (1.5)

38. What increase in average rainfall will south-east England see?
Circle the correct answer:

a) less than 1% b) more than 1% c) not less than 1% (1.5)

39. Which area of England will have the largest increase in rainfall?
Circle the correct answer.

a) south-east England

b) north-east England

c) north-west England (1.5)

40. Which season(s) will become:

a) **drier?** Circle **one**:

spring summer autumn winter (1)

b) **wetter?** Circle **two**:

spring summer autumn winter (2)

41. Showers will become heavier.
Circle the correct answer.

True **False** (1)

V: Global warming and flooding

42. What has become an annual event in recent years?

_____ (2)

43. According to John Vidal, how many homes have been flooded and at what cost?
Circle the correct answers:

a) 20,000	25,000	200,000	**homes**	(1.5)
b) £1 million	£1 billion	£1 trillion	**cost**	(1.5)

44. People in flood-prone areas won't have difficulty selling their homes:
Circle the correct answer.

True **False** (1)

45. Why are builders building houses on river flood plains?
Circle the correct answer:

a) because it is the safest place to build

b) because the land is flat

c) because of the housing shortage (1.5)

46. Circle the words or phrases that best describe the town of Lewes near Brighton:
Choose **3 only**.

modern	convenient for London	attractive
old	next to the sea	undeveloped (3)

47. How many buildings were damaged in 2000?
Circle one answer:

a) 1960 b) 830 c) 2000 (1.5)

48. Why did Lewes experience greater flooding in 2000?
Circle one answer:

a) because of the heavy rainfall

b) because of building on the flood plain

c) because of a combination of a) and b) (1.5)

VI: The future: controlling the effects of heavy rainfall

49. According to the lecturer, has rain controlled our lives in the past?

Yes **No** (1)

50. According to the lecturer, is rain starting to control our lives again?

Yes **No** (1)

51. Circle the 3 effects that will make the future appear a lot wetter.

global warfare	government action	intensive building
climate change	global change	natural flooding

(3)

This is the end of the Listening Examination: **Total 92 marks**

Candidate Identifier Number:_____ ****Answers****

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(1/2 mark for each component)

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Write **C** in the box for the **Cause** or **E** for the **effect**.

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c) they were full of holes **C** ☐

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a) they had a great effect on travel **3** ☐

b) they could be used all year round **2** ☐

c) they had a smooth, hard surface **1** ☐

d) they improved trade **4** ☐

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A raincoat (1)

15. What material did MacIntosh use to make his clothing waterproof? Circle one answer.

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16. What was the significance of the date 1823?

Invention of the raincoat/waterproof clothing/raincoat = 1 (2)

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(1)

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National Gallery = 1/ Tate Britain (art gallery) = 1

(2)

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(1.5)

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Yes **No**

(1)

35. Name **one** of the 3 effects of global warming

Higher summer temperatures in northern hemisphere / heavier rain / increase in natural disasters / increase in floods or drought (2)

36. According to the lecturer, which continent is currently experiencing severe drought?
Circle one.

a) Asia **b) Africa** c) Australasia (1.5)

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(3)

This is the end of the Listening Examination:

Total 92 marks

43

RAIN

Introduction

I. A definition of rainfall and some rainfall statistics

II. The historical impact of technology in controlling the effects of rain in the UK

III. What is rain? How does it work?
[An explanation of different causes of rain]

IV. Global warming and rain

V. Global warming and flooding

VI. The future: controlling the effects of heavy rainfall

Conclusion

Rain – Revised for Spring 2006

What's the weather like today? Grey, rainy, typically British? Why do English people always talk about the weather? As Dr Johnson famously wrote in 1758, 'When two Englishmen meet, their first talk is of the weather.' Why do students learning English always seem to know the expression: 'It's raining cats and dogs'? Why does the stereotypical image of an English gentleman always include the umbrella? The answer is rain. Rain has always been a part of British life and looks likely to continue to be so, although not perhaps in the same way as before. What is not apparent to recent overseas visitors is that the kind of rain, the frequency and the season when it falls have changed. In a way, we have become more focussed on rain than ever before - and that is the main topic of today's lecture. I'd like to refer you to a new book [show] entitled 'Rain' by Brian Cathcart [OHT], a journalist, which prompted me to write this lecture and on which much of it is based. You can buy this book at Waterstones. I've divided this lecture into six parts as follows: [OHT]

To start with, I'll give you some facts and figures....

This is the start of the questions section

1. **A definition of rainfall and some rainfall statistics**

As we all know, there are different kinds of rain, or precipitation which is the more technical term. It is generally accepted that what we call 'heavy rain' falls at a rate of 4.0mm per hour or more; light rain at less than 0.5mm per hour and moderate rain between the two. The English language distinguishes between rain and showers. A shower is a short burst of rain, that is, rain which starts and stops suddenly and is often followed by a clear sky. Heavy showers fall at a rate of 10mm per hour or more; light showers at less than 2mm per hour and moderate showers in the middle of these two. We talk of 'continuous' rain - and this is what we have been experiencing more and more in recent years - when it has fallen for the preceding hour with breaks not longer than 10 minutes. If breaks in the rain exceed 10

minutes, this is called 'intermittent' rain. If you would like to read more about this you can consult the book 'Teach Yourself Weather' by Ralph Hardy.

How do we know the weather is changing? Here in the UK, we have weather records that go back three and a half centuries, which began in the 1660s, and so we are able to track, or monitor changes. The 1990s were the warmest decade ever recorded in central England. The consequences of this have been analysed. According to the UK Climate Impacts Programme, which was set up by the government in 1997 and is based at the University of Oxford, the growing season for plants in central England has lengthened by about one month since 1990. Summers have become hotter and winters milder - there are fewer frosts and cold periods. Winters over the last 200 years have become much wetter relative to summers throughout the UK. This means that snow is also less likely than it used to be.

Now, a larger proportion of winter rain falls as very heavy, persistent rain, which was not the case 50 years ago. This means that the rain is heavier and wetter and resembles monsoon rains in tropical and sub-tropical areas of the world (which many of you are familiar with). Since about 1997 many British people have noticed that (and I quote Cathcart) 'we have been wet in a way we do not remember experiencing before.' To illustrate this, my friends and I have remarked that now we often have wet feet - our shoes are not waterproof enough to withstand such heavy rain. At the same time, we seem always to be wearing waterproof jackets rather than coats in winter. So, winter weather in the UK is warmer but wetter and our wardrobe has had to change accordingly. Our homes have also been affected, with leaking roofs and severe floods in many areas. I' ll return to some of these effects later in the lecture.

Specifically, the period between spring 2000 and spring 2001 was the wettest 12 month period ever recorded in England and Wales - with April 2000 having over double the average rainfall amount, and being the wettest April on record. The autumn months, September, October and November 2000 formed the rainiest autumn. After this long rainy period, the year 2002 continued to be wet and in fact, ended on an extremely wet note at the end of December, with one week's almost continuous heavy rain in southern England. According to

the Meteorological Office, southern England experienced the wettest November and December in 2002 for more than 30 years. 'In November 1970 there was 161 mm of rain in the southeast and 214 mm over the southwest'. The figures for November 2002 are 183mm and 232 mm respectively. December 2002 had a total rainfall of 131mm which was 140% of the 1961-1990 average.

II. The historical impact of technology in controlling the effects of rain in the UK

Nowadays, we take it for granted that we can keep ourselves dry, go about our daily business without taking any serious notice of the rain. For us in the UK, rain is an inconvenience but not a barrier to living our daily lives. But it was not always like this. In the past, being cold, wet and unable to travel far were all effects of rain. The famous English novelist, Jane Austen, has written books full of references to heroes and heroines getting wet in the rain and then falling ill or even dying as a result. For example, in *Sense and Sensibility*, the heroine, Marianne, is rescued from a twisted ankle in a torrential rainstorm. In our world of mobile phones and Starbucks coffee bars, this is hard to imagine. What has changed? Cathcart outlines ways in which science and technology have overcome the negative effects of rain on communication and economic development.

Firstly, a Scot named John McAdam (that's Mc*capital* Adam) invented a new technique for building roads. Up until the end of the 18thC, roads, especially in winter, were muddy, full of holes and virtually impassible. Travel beyond one's own town or village was a nightmare and many roads were actually closed in wet weather. In some places roads were one or two kilometres wide, showing how travellers had tried to avoid existing mud and holes by going round them. What McAdam did was to build up an earth road to stand above the level of the surrounding land. This prevented the accumulation of water and mud. He then put layers of very small stones on top of the earth; each layer was levelled and allowed to settle before a new layer was added. Finally, the passage of carriages and carts over the stones ground them to a fine powder and created the smooth hard surface which we now describe as macadamised. A macadamised road is an all-weather road and it revolutionised travel and commerce in the 19th Century.

Another Scot, named Charles MacIntosh (that's Mac*capital* Intosh) invented the Macintosh - a word used by my parents' generation for raincoat. [OHT] Previously, people kept dry in the rain by wearing layers of thick clothing. Often these clothes were oiled but this was not very effective. MacIntosh used a product that had been around for centuries - rubber. In fact the Spanish discovered it when they conquered South America. So far, no one had been able to incorporate it into cloth but MacIntosh invented a technique to make rubber stable. He was able to fix it between sheets of wool, rather like a sandwich and in 1823 the first rainproof coat was born. A man who had a MacIntosh coat could ride his horse through a heavy shower and emerge with his clothes completely dry. So, after 1823, it would not have been the rain that prevented a pair of lovers from meeting!

In addition to the previous two technological developments - the all-weather road and waterproof clothing, a third development, this time in science changed the way rain affected people's lives: weather forecasting. If you know what the weather is going to be like, you can plan accordingly. To forecast the weather you need to understand how it works, which includes understanding clouds. Although today every primary school child knows about the water cycle - evaporation from the sea makes clouds, clouds make rain, rain makes rivers and rivers run into the sea - the principle of the water cycle [OHT?] was unknown until the 19th C. Luke Howard, not well known like McAdam and MacIntosh, wrote a book called 'On the Modification of Clouds' which was published in 1802. His was the first real classification of clouds and remains in use, almost unchanged, today. Interestingly, the 19th C English landscape painter, John Constable, who is famous for his painting of cloud formations, made use of Howard's work on clouds. [OHT] You can see Constable's paintings in the National Gallery and the Tate Britain art galleries. To summarise, the inventions of the all-weather road, the waterproof raincoat and Howard's work on clouds all contributed towards the development of communication and economic life in Britain. Howard's work, in particular, was the forerunner of an increasingly deep understanding of the weather. This is the topic of my next section,

III. **What is rain? How does it work? [An explanation of different causes of rain]**

I′ d now like to explain briefly what happens when it rains, focussing on the UK, and then move on to how global warming is affecting rain. There are three basic causes of rain - that is, there are three sets of conditions which must be present for rain to fall. Firstly, I′ d like to talk about showers, which we are having more of these days. [OHT]. Air over the earth is warmed by the sun, thus causing the air to rise. As it rises it takes with it a lot of warm water vapour. In the UK, much of this has come from the Atlantic Ocean, brought in by westerly winds. [Vapour is another word for steam or evaporated water. For example, water vapour forms in your kitchen when you are boiling water]. Fog and mist are also forms of water vapor. Anyway, as this vapour rises, it comes into contact with colder air and condenses and forms clouds. Inside these clouds is a mixture of ice and vapour which combine to form snow. As the snow falls it melts when it comes into contact with warmer air and falls as heavy rain or showers.

Secondly, I′ d like to talk about what the experts call 'orographic′ rain [OHT]. Orographic means related to mountains. So orographic rain is precipitation that is caused by mountains. You are probably familiar with the explanation of this kind of rain. When a mass of warm moist (or wet) air meets a mountain range, it is pushed upwards. As a result it cools down, condenses and falls as rain. The orographic effect, as it is called, is strong in all the wettest places of the UK, such as the Lake District, Wales, the Highlands of Scotland. [OHT map of UK] Generally, the mountains in the UK lie on the western side of the country, which explains why it is so much wetter, in some cases, three times as wet, as the east of the country. You might like to remember this when planning a trip in the UK.

The final general cause of rain is 'frontal systems′. [OHT of weather systems]. We are all familiar with the diagrams of such systems from TV Weather forecasts and in the newspapers. Unlike the two previous causes, which are local or national, frontal systems are global and not at all stable. We still do not really understand how increased temperatures affect these frontal systems. Very briefly, for us in the UK, cold air flowing south from the North Pole meets warm air pushing north from the Equator. At the meeting point, which is a

line somewhere in the middle of the northern hemisphere, some of the warm air is squeezed into the cold air and forms arrowheads pointing northwards. Here in the UK, we experience this process as a background of cold air with an arrowhead of warm air pointing into it which can be 2-300 kilometres long. So we may have a period of cold weather followed by a short warm period and then by another cold period - it all depends on the size of the arrowheads. In addition, because the air has flown over the Atlantic Ocean to reach us, it is generally full of water vapour. As you can now imagine, this situation gives plenty of opportunities for rain! It also partly explains why British weather is so variable and why you can have four seasons in one day - winter in the morning, summer at lunchtime, autumn in the afternoon and spring as you go to bed!

So, I have outlined, clearly I hope, the basic reasons why it rains. What is surprising about all this, because it now seems so obvious to many of us, is that these causes were not fully understood until the last century, the 1930s in fact. In my next section, I'd like to describe how global warming affects the rain in the UK.

IV Global warming and rain

Global warming is the process whereby the temperature of the earth and its atmosphere is increasing. When we use the term 'global warming' we generally refer to the causes and effects of such a process. A majority of scientists, but not all, believe a basic cause of global warming is the increase in greenhouse gases, such as carbon dioxide, which is emitted by industrial processes and modern forms of transportation, such as the car. The effects, it is believed, result in higher summer temperatures in the northern hemisphere, heavier rain and an increase in natural disasters such as floods and drought. Drought, by the way, means a prolonged period without rain. Many parts of Africa are experiencing a severe drought as I speak. The Intergovernmental Panel on Climate Change (the IPCC) has been monitoring changes since 1988 when it was first officially accepted that the global climate is becoming warmer.

So, how does global warming affect our 'good old British' rain?

Higher temperatures, such as have been measured in the UK and mentioned before, mean more evaporation off the sea This in turn means higher rainfall. It is predicted that if the world continues to warm as it has done, the south-east of England is likely to see an increase of at least 1% in average rainfall. Areas to the north and west will have larger increases. The real threat, however, is not the total mount of rain but the way in which it falls. No one is quite sure how the physics works, but it is generally believed that higher temperatures will alter the distribution of rain throughout the year and the kinds of showers we have. Summers in the UK will become drier, which means that all the more rain will fall in the other seasons, especially autumn and winter. There will also be fewer light showers and more heavy ones, such as I have already described. This combination of wetter winters and more frequent heavy showers is the usual cause of floods.

V Global warming and flooding

Not only are we already experiencing increased rainfall, we are also suffering from flooding. Autumn floods have already become an annual event in recent years. The British government has admitted 'We cannot prevent floods'. In the past 3 years, according to the Guardian newspaper's correspondent, John Vidal, 25 people have died in Britain and more than 20,000 homes and businesses sited on river flood plains have been flooded at a cost of more than £1bn. People in flood-prone areas are already finding it difficult to sell their houses. Few people will now move to a flood-prone area. Builders are being warned against building on river flood plains (that is, the flat land either side of the river), but with the current intense housing shortage, many are ignoring such warnings. The pressure to build new homes for increasingly smaller family units in the UK is intense.

I'd like to give a concrete example. Lewes near Brighton on the south coast suffered severe floods in 2000. The area has become increasing popular with commuters who work in London and there has been a lot of development - especially housing. This ancient historic and beautiful town is built along a river that has a history of flooding - the last great flood was in 1960. In 2000 the number of buildings that were badly damaged was about 830, far more

than in 1960. At that time the response to the flood was to blame the rain and try harder to control the river. In 2000, on the other hand, not only was the weather blamed but it was accepted that part of the cause was also extensive building on the river's flood plain. When the river started to flood, the water had nowhere to go because of all the new building on land which had previously absorbed some of the excess water. In other words, human activity had contributed to the already severe effects of a natural event such as prolonged heavy rain. This story is being repeated throughout the UK.

VI The future: controlling the effects of heavy rainfall

To sum up, I have described what rain is, how the pattern of rainfall in the UK is changing and some of the effects. I have looked at how through developments in science and technology, rain no longer controls our everyday life and activities. Until recently, that is. I have tried to show how rain has started to retake control after nearly two centuries. Once again, we are more anxious about rain - will the river flood, will the roof leak, will I get too wet?

Finally, we have seen how a lethal combination of intensive building, a natural tendency to flooding in some areas and climate change in the form of heavier rain over shorter periods, has made the future appear very wet and uncertain for many in the UK, as well as throughout the world. Governments cannot change the weather, but they can prevent human activities that make the effects of bad weather worse. It is to be hoped that this will happen, not only in the UK but in other areas which are more likely to flood easily. Thank you for your attention.