<u>AEN 3109 CLIMATOLOGY AND MODELLING</u>

Lecturer   Mr. Iwadra Michael
              MSc Water Resources Engineering (KULeuven, VUB, Belgium),
              MSc Hydrotechnics: Irrigation and Drainage Engineering
              (Moldavia),
              Fulltime Lecturer.

Course Type: CORE (B.Sc. Agric. Engineering III)

1. COURSE
Course Credits (CU):   3 CU i.e. 45 Contact Hours per semester

Course Duration: 15 weeks (45 hours) i.e. 30 LH, 30 PH

COURSE DESCRIPTION
Climatology and Climatological data, instrumentation and analysis. Probability concepts in hydrological forecasting; rainfall frequency, and drought. Modelling

2. COURSE OBJECTIVES
To produce agricultural engineering graduates who:
- Understand the concepts and principles of climatology and it's importance in agriculture/agricultural engineering
- Understand the principles of operation, installation and maintenance of climatological instruments
- Can collect, analyse and use climatological data in solving agricultural engineering problems

3. READING LIST
- Barry R. G. and Chorley J. R., 1987. **Atmosphere, Weather and Climate**. Methuen and co. Ltd, London.
- Chow Ven Te, 1988. **Applied Hydrology**. McGraw-Hill, Inc.
- Chritchfield H. J., 1974. **General Climatology**. PRENTICE-Hall, INC. Englewood Cliffs, New Jersey.
- Henderson- Sellers A. and Robinson J. P., 1986. **Contemporary Climatology**. Longman Group UK Ltd.
- Jackson I. J., 1989. **Climate, Water and Agriculture in the Tropics**. Longman Group UK Ltd.
- Landsberg H., 1966. **Physical Climatology.** Gray printing Company, INC, Pennsylvania.
- Ritzema H. P., 1994. **Drainage Principles and Applications**. ILRI Publication 16, The Netherlands.
- Shahin M., Van Oorschot H. J. L. and De Lance S. J., 1993. **Statistical Analysis in Water Resources Engineering**. A. A. Balkema, Rotterdam.
- Ward A. D. and Elliot W. J., 1995. **Environmental Hydrology**. CRC Press, Inc Lewis Publishers.

4. COURSE CONTENT, METHODS OF INSTRUCTION, TOOLS AND EQUIPMENT REQUIRED

Lecture	CONTENT	METHOD OF INSTRUCTION / Time allocated	TOOLS / EQUIPMENT NEEDED
LECTURE 1. **Climatology**	- Definition of climatology, meteorology, weather - Elements of climate and data	Interactive Lecture (2 hrs)	LCD Projector and Screen, BB/Chalk,
LECTURE 2. **Climatology**	- The atmosphere - The sun and radiation from the sun	Interactive Lecture (2hrs)	LCD Projector and Screen, BB/Chalk
LECTURE 3.	- Reception of solar radiation on earth	Lecture (2 hrs)	LCD Projector and

Climatology	• Green house effect, global warming		Screen, BB/Chalk.
LECTURE 4 Climatology	• Effect of climate on human activities (agriculture, engineering) • Hydrologic cycle and its components	Interactive Lecture (2 hrs)	LCD Projector and Screen, BB/Chalk
LECTURE 5 Climatology	• Rainfall (Cloud Condensation Nuclei, CCN, Cloud formation, types of clouds) • Types of rainfall	Lecture (2 hrs)	LCD Projector and Screen, BB/Chalk.
LECTURE 6 Climatology	• Pressure, resultant force and wind • Tropical activities	Lecture (2 hrs)	LCD Projector and Screen, BB/Chalk,

LECTURE 7 Weather stations, Instruments	• Weather stations
	 • Types of
	    o Rainfall gauges
	    o Thermometers
	    o Radiation measurement instruments
		Interactive Lecture (2 hrs)	LCD Projector and Screen, BB/Chalk

LECTURE 8 Weather stations, Instruments	• Types of
	    o Wind vanes, anemometers
	    o Evaporation measurement instruments
	    o Barometers
		Lecture (2 hrs) Field visit to weather station (6 hrs)	LCD Projector and Screen, BB/Chalk Transport (30 seater)

LECTURE 9 Continuous assessment test 1		2 hrs	
LECTURE 10 Probability concepts in rainfall frequency and drought	• Data recording and analysis • Probability of exceedence and non-exceedence • Wet, normal and dry periods	Lecture (2 hrs) Field trip (3hrs)	LCD Projector and Screen, BB/Chalk Probability graph paper
LECTURE 11 Probability concepts in rainfall frequency and drought	• Methods of frequency analysis • The interval and ranking method and its application	Lecture (2 hrs)	LCD Projector and Screen, BB/Chalk Probability graph paper
LECTURE 12 Probability concepts in rainfall rainfall frequency and drought	• Normal probability distribution • Application of the normal probability distribution in climatology	Lecture (2 hrs) Field trip (4 hrs)	LCD Projector and Screen, BB/Chalk Probability graph paper
LECTURE 13 Probability concepts in rainfall frequency and drought	• The Gumbel probability distribution • Application of the Gumbel probability distribution in climatology	Lecture (2 hrs) Field based visit to department of meteorology (6 hrs)	LCD Projector and Screen, BB/Chalk Probability graph paper Transport (30 seater)

LECTURE 14 **Continuous assessment test 2**		2 hrs	
LECTURE 15 **Modelling**	• Definition • Scientific principles and procedure of modelling • Types of models	Lecture (2 hrs) (Seminar data collection and analysis presentation) (18 hrs)	LCD Projector and Screen, BB/Chalk Probability graph paper

5. SUMMARY OF TIME NEEDED

Lectures covering theory   30 hrs
Field visits   12 hrs
Seminars   18 hrs

6. OVERALL COURSE EVALUATION

Continuous Assessment Test   20%
 • At least 2 tests (first after lecture 8 and second after lecture 12)
 • Marked out of 20 each

Continuous Assessment (Assignments, practical, Field work)   20%
 • At least 1 assignment
 • Practical
 • Field trip by attendance
 • Marked out of 20 each

Final examination   60%