Course Outline (see on page 2).

**Course Objectives:** The intent of the course is to give the students the most important epidemiological principles in host-pathogen interactions. The course is designed to present this through areas of importance at the present time including host-pathogen interactions with environment, novel methods in identifying and monitoring pathogen movement, spread, diversity between and within pathogens, diversity and influence of microorganisms in soil and methods of measurement, ecological fitness, forecasting diseases in order to better manage with less pesticides. The hope is that at the end of the course, the student will be able to derive principles of plant disease epidemiology/management from knowledge of different aspects studied and learnt in class. The course will familiarize students with some important topics and literature concerning plant disease epidemiology and also introduce some novel molecular approaches towards it. It will also encourage development of skills necessary for critical evaluation of research articles. Although not restricted to, the emphasis will be on the epidemiology of cereal, oilseeds, and special crop diseases (i.e. potatoes, legumes) of current importance in Western Canada.

**Instructor:** Dr. Dilantha Fernando, Plant Science, Rm. 205 Agriculture, Phone 474-6072 E-Mail: Dilantha.fernando@umanitoba.ca

**Timetable:** Meeting for lectures, and class presentations - Wednesdays from 1.00 to 3.30 pm
Weekly student meetings for paper discussions – Mondays from 1.30 to 3.00 pm

**NOTE:** Both classes will be held in Room 218. For both days I have booked the Computer #3 from the Main Office. All computers in the main office are brand new and should function well for any application.

**Texts (Highly Recommended to read but not required to purchase):**

4. Disease of Field Crops in Canada 3rd Edition by Bailey, Gossen, Gugal and Morrall (this book can be purchased easily at the Bookstore and is very cheap - $ 25.00)

**Text required TO READ:** All research articles that are distributed in class, or requested to download and read.

**Student Evaluation:**

- Epidemiology Presentations and Discussions 25%
- Term paper related to an epidemiological topic 25%
- Disease Management Lecture 25%
- Paper Reviews and presentations/discussions 25%
ROASS
In accordance with the calendar regulations concerning ‘Responsibilities of Academic Staff to Students’ students are reminded that ‘academic dishonesty’ including ‘plagiarism and cheating’. Note also the date for voluntary withdrawal from first term.

Final Note: Remember, there are no mid term exams or a final exam in this course. Thus, presentations, participation in discussion, term paper should be taken very seriously if you are to master the subject of plant disease epidemiology, achieve high standards and get a good grade.

PLNT7480 Epidemiology in Plant Disease  Winter 2014

GENERAL COURSE OUTLINE

Influence of Pathogen
(1) Dispersal Units and Methods utilized in Trapping Dispersal Units

Influence of Environment
(2) Macro and Micro Climatic Data Analysis

Influence of Host
(3) Susceptible and Resistant Cultivars and Gene for Gene Hypothesis

(4) Mathematical Modeling in Plant Disease Epidemiology
Monocyclic and polycyclic disease, disease progress curves, various models

Disease in Space
(5) Disease Gradients in relation to Disease Development from an inoculum source

(6) Pathogen / Disease Spread Molecular Analysis -
Chemotypes, pathotypes, Gene flow, heterozygosity, Shannon Index.

(7) Genetic Diversity & population structure with methods (AFLP, SRAP, etc).
Geographic Population differentiation, genotypic diversity, genetic distance.

(8) Populations and diversity of microorganisms in soil – for disease management
Influence of the crop, soil-type, analysis methods and population variation.

(9) Influence of the macro and micro climate in a Tri-partite Host-pathogen-microorganism interaction
The influence of nutrients, pH, temperature, moisture, and other external factors

Disease forecasting systems and equipment
(10) Disease in Time - disease forecasting - Methods to predict disease
Evaluation 1: STUDENT PRESENTATION 25%
(Epidemiology Presentations and Discussions)

This will be done in groups of 2 (Two students per group)


(2) Student GP2 Epidemiology in sustainable systems, Ecological Fitness of Prokaryotes and Eukaryotes – understanding genes and their functions [MONDAY MARCH 31, 2014]

(3) Student GP3 Global Climate Change and its effect on plant disease and disease epidemiology [MONDAY APRIL 7, 2014]

(4) Student GP4 Host plant resistance, host plant diversity, plant mixtures and disease resistance genes [WENDSDAY APRIL 9, 2014]

Evaluation 2: Term paper related to an epidemiological topic 25%

Each student with the help of the course instructor will select an important epidemiological topic to write a term paper. The topic should be decided no later than Feb 15th, 2014. This would be in the form of a comprehensive review that could be publishable in a peer reviewed journal. The term paper is due on April 1, 2014. The paper should not be less than 25 pages and in double space 12 pt font size (without the references). The term paper and the topic presented (in evaluation 1) cannot be in the same area.

Evaluation 3: Disease Management Lecture 25%

This will be done in groups of 3 (three students per group)

Each group will create a lesson of a plant disease common to the Canadian prairies. The lesson should emphasize disease management recommendations in particular related to epidemiological principles, and needs to be a visual product suitable for incorporation into a website. The project and presentation can include any number of areas starting from pathogen spores to on farm management methods. The key is to make it as visual as possible with a target audience in mind. The target audience is commercial growers, extension agents, provincial plant pathologists, crop scouts, crop advisors and pesticide applicators (not limited to). You can use your innovative skills to make this a very watchable presentation.
Evaluation 4: Paper Reviews and presentations /discussions  25%

This exercise will be done in groups of two. For each class, one student will present a review paper on an epidemiological topic related to plant diseases. Each review paper will be selected by the two students and sent to the course instructor for approval by February 1, 2014. The second student in that group will select a related peer reviewed published manuscript to follow as a presentation during the same class. All students will have read both the papers and come prepared to ask questions. For each class (which will be on Monday afternoons) there will be two student moderators who will conduct the class which will consist of two presentations (one review paper and one publication). The students who presents in a particular week will be the moderators for the next class and presentations. As moderators, they are also responsible for giving a written report to the course instructor three days after each class. Please send this electronically to Dilantha.fernando@umanitoba.ca