

# Spring 2014

Course name:

## PLP 2143/ENTO 2143-Global Issues in Agricultural Biosecurity & Forensics

**Class outlines:** To be downloaded from class web page at Desire2Learn (D2L OSU) portal.

**Instructor:** Dr. Francisco M. Ochoa Corona [Office: 130 F, Henry Bellmon Research Center (HBRC)].

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**Office Hours:** Monday-Friday. 4:00pm - 5:00pm. Call or e-mail if visiting, there are entry restrictions to the HBRC, or by appointment out the specified time.

**Class Meetings:** Tuesday and Thursday, 10:30 a.m. to 11:45 a.m. Room: NRC 216.

Please keep this room clean; do not leave behind newspapers, bottles, papers, residues, etc.

### Course description

The aim of the course is to provide insights and practical understanding of the fundamental components of a balanced and effective biosecurity system. This course will introduce the relevance of the sciences involved in biosecurity and microbial forensics and how all system components operate and integrate to a broad range of scientific Agricultural specialties including Biology, Economics and Defense. This course is a new, attractive and interesting professional option to prepare graduates for a career in biosecurity and microbial forensics, related research, science, or roles in biosecurity agencies. As we examine study scenarios and topics of global significance in agricultural biosecurity and forensics, the student learn from class work, selected readings, literature research, reporting, video lectures, and guest expert(s) lectures. In addition, a comprehensive final simulation exercise will allow students to experience, practice and discuss strategies, techniques and applications relevant to agricultural and ecological biosecurity and microbial forensics, as well as critical discussions.

The main focus and/or component areas covered by this course are:

- Definitions of biosecurity in its broad sense, to include biosafety, bioterrorism, biowarfare, biocrime, food security and microbial forensics, new and emerging organisms, and invasive species on a global scale.
- Quarantine, response and surveillance.
- Detection, diagnostics and forensics technologies.
- How to integrate biosecurity despite the student career-orientation, i.e. economics, military arts, biochemistry, statistics, psychology, engineering, agriculture, animal sciences, administration, etc.

**Pre-requisites:** none.

### Required Text and Readings:

- No textbook required
- WEB-Readings sources, book chapters or articles references will be provided or indicated.
- Handouts or supportive material will be provided during the semester (or posted in Class homepage) if any.

### Course Goals and Objectives:

- To introduce a practical understanding (and terminology) of the fundamental components of an agricultural biosecurity system and microbial forensics.
- Provide insights and a perspective of the relevance and the role agricultural biosecurity and microbial forensics systems plays in agriculture, the economy, the society and governments.
- To communicate relevant study cases of global significance in agricultural biosecurity system and microbial forensics to develop critical thinking and develop awareness.
- Review how biosecurity and microbial forensics systems operate and integrate to a broad range of scientific Agricultural specialties including Economics and Defense.

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### Students will be expected to:

- To gain a basic understanding of basic definitions and concepts related to Ag biosecurity and microbial forensics.
- To develop working knowledge about the role agricultural biosecurity and microbial forensics systems plays in safe trading, policy, sciences and national security.
- To understand how a career in Ag biosecurity and forensics integrate to a broad range of scientific Ag specialties including Economics and Defense.
- To develop awareness about the impact unwanted pest and diseases can cause to agriculture, the economy and on human cultures.
- To develop concise reports that relate to the impact of pest/diseases, unwanted organisms or invasive species can cause on a country, region or society.

### Attendance:

Students are expected to attend **all lectures, take exams as scheduled**, and turn in reports on due dates. There will be **no** makeup tests for the hour exams unless students provide documentation of a university-sanctioned activity or other critical upcoming activity. If students know will have such a circumstance students must contact the instructor **at least one week before the test**.

**Note:** If class is missed, it is your responsibility to obtain any assignments or handouts, to make arrangements if assignments are due, and to be familiar with the contents of the lectures.

**Professionalism** - Please be considerate of your fellow classmates. Side conversations are not allowed because tend to be distracting to those taking notes. Late arrivals are equally distracting and are not allowed. Disruptive behavior may include (but not limited to) repeatedly coming late or leaving early, miscellaneous noisy distractions, cell phone usage, laptop usage (other than note-taking). Students who are consistently & repeatedly discourteous to fellow class-mates (even after being warned) may be asked to leave or be subject to "professionalism point deductions"

### Drop Policy:

See University Regulations (Outlined in Directory of Classes - Class Schedule - fall and/or spring).  
<http://www.okstate.edu/registrar/ClassSchedule/Spring2014/ClassSchedule.pdf>, page5.

Reminder: just because you quit coming to class doesn't mean you are automatically dropped. If you want to drop, YOU must initiate that process with the registrar.

### Academic integrity policy

OSU is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g. unauthorized collaboration on homework or assignments, plagiarism, multiple submissions of the same assignment, cheating on examinations, fabricating information, helping another person cheat, having unauthorized advance access to examinations, altering or destroying the work of others, and fraudulently altering academic records) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript and being suspended from the university. You have the right to appeal the charge. Contact the Office of Academic Affairs, 101 Whitehurst, 405-744-5627, <http://osu.okstate.edu/acadaffr/aa/academicintegrity.htm>

**Plagiarism and non-independent work, unless specifically allowed, will result in a failed grade for the assignment and/or a failed grade for the entire course. Violations of academic integrity are also considered unprofessional and will result in forfeiture of all professionalism points. Please review the university-recommended sanctions for violation of academic integrity at the end of this syllabus.**

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## Grading:

### Point Distribution:

- **Three (3) 80-points exams.** *One-hour exam* **240 points**
- **Twenty (20) 10-points assignments.** *Assigned reading and questionnaires* **200 points**
- **Attendance to six (6) 10-points guest speaker lectures.** **60 points**
- **Total** **500 points**

Final grades will be determined using the following percentages of the total point accumulation during the semester: **A = 90+% (450 points)**; B = 80 to 89% (400); C = 70 to 79% (350); D = 60 to 69% (300); and F = 59% or below (295).

**LATE PENALTIES APPLY FOR ALL LATE ASSIGNMENT SUBMISSIONS  
—2.5 POINTS OFF FOR EACH CALENDAR DAY LATE—**

### Personal score tracking table

Class work	Points earned	Subtotal	Class work	Points earned	Subtotal	Class work	Points earned	Subtotal
Exam 1			Assignment 1			Assignment 11		
Exam 2			Assignment 2			Assignment 12		
Exam 3			Assignment 3			Assignment 13		
Guest speaker 1			Assignment 4			Assignment 14		
Guest speaker 2			Assignment 5			Assignment 15		
Guest speaker 3			Assignment 6			Assignment 16		
Guest speaker 4			Assignment 7			Assignment 17		
Guest speaker 5			Assignment 8			Assignment 18		
Guest speaker 6			Assignment 9			Assignment 19		
			Assignment 10			Assignment 20		
<b>TOTALS</b>								

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### 'Tentative Program Schedule'

#### **Lecture 1-Jan 14-Week 1**

Introduction. Syllabus. Professor and student expectations. Teaching philosophy, grading and evaluation, dynamic and scope of the course. **Classwork:** What is biosecurity? An attempt to define it.

**Assignment 1. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Jan. 16, 2014.

#### **Lecture 2-Jan 16-Week 1**

Invention vs. innovation. Modeling vs. discovering. Can we invent & innovate in biosecurity and forensics sciences? Is there a genius inside you?

**Assignment 2. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Jan. 16, 2014.

#### **Lecture 3-Jan 21-Week 2**

Specialty areas within biosecurity, building a career in biosecurity. Sciences related to biosecurity and microbial forensics. Biosecurity, Agricultural biosecurity and food security definitions. Scientific and political framework. Relevance. Biosafety, biodiversity and other relevant and associated concepts. Sciences related to biosecurity and microbial forensics and the importance of the political framework.

**Assignment 3. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Jan. 21, 2014.

#### **Lecture 4-Jan 23-Week 2**

Comparison of the concepts of Terrorism, bioterrorism, agroterrorism regarding Biosecurity and plant, animal and food biosecurity. Agricultural, political and economic impacts of dangerous introductions.

**Assignment 4. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Jan. 23, 2014.

#### **Lecture 5-Jan 28-Week 3**

Characteristics of a bioweapon Cases of microorganisms used as weapons in war time.

**Assignment 5. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Jan. 28, 2014.

#### **Lecture 6-Jan 30-Week 3**

Facts about international trade and diverse reasons to introduce. Global movement of humans, pests, microorganisms, weeds, and seeds. Examples and study cases of beneficial and detrimental introductions related to terrestrial, marine, and aquatic scenarios.

**Assignment 6. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Jan. 30, 2014.

#### **Lecture 7-Feb 04-Week 4**

Introduction to incursion (invasion) biology. Related terminology (indigenous, exotic, naturalized, invasive, pests). Types of introductions. Disruption of the normal ecosystem function by exotic species.

**Assignment 7. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Feb. 04, 2014.

#### **Lecture 8- Feb 06-Week 4**

Invasive species. More examples and study cases of detrimental introductions related to terrestrial, marine, and aquatic scenarios.

**Assignment No. 8 (10 points)** Application for permit to move live plant pests or noxious weeds, PPQ 526. Free choice of insect, microbe or weed of interest for students, or suggested by the instructor after students request. Individual project, but consultation with peers, faculty or internet sources is allowed. **Due date:** Feb. 06, 2014.

#### **Lecture 9-Feb 11-Week 5 (10 points)**

1<sup>st</sup> Guest speaker. **Dr. Bruce Noden** Insects as vectors of animal and human diseases. Unwanted

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insects/pests of biosecurity relevance for the U.S. and Oklahoma.

**Assignment 9. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Feb. 11, 2014.

### **Lecture 10- Feb 13-Week 5 (10 points)**

2<sup>nd</sup> Guest speaker. **Dr. Astri Wayadande.** Insects as vectors of plant diseases. Unwanted insects/pests of biosecurity relevance for the U.S. and Oklahoma.

**Assignment 10. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Feb. 13, 2014.

### **Lecture 11- Feb 18 -Week 6 (10 points)**

3<sup>rd</sup> Guest speaker. **Dr. Jacqueline Fletcher.** Biosecurity and forensic sciences.

**NO Reading or assigned material.** Study time granted for Examination 1.

## **1" examination-Feb 20-Week 6 (80 points)**

### **Lecture 12 - Feb 25-Week 7 (10 points)**

4<sup>th</sup> Guest speakers. **Dr. Li Ma,** OSU NIMFFAB. Food safety and biosecurity. Relevance, examples of most common food borne diseases.

**Assignment 11. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Feb. 25, 2014.

### **Lecture 13-Feb 27-Week 7**

Epidemics and epizootics. Conflicting definitions in different fields. Incursion pathways (routes) and common biosecurity gaps. Phases of the incursion or invasion process. Ecosystems and diffusion models. Predicting invasions. Exotic species and their implications for evolution. Study cases in terrestrial, marine, and aquatic scenarios.

**Assignment 12. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Feb. 27, 2014.

### **Lecture 14- Mar 04-Week 8**

The concept of biosecurity zones. The quarantine process. How agricultural quarantine and forensic plant pathology overlap. Border, post-entry quarantine, post-entry quarantine transitional facilities, policy, pre-clearance and post-clearance issues. Containment levels and challenges. Border and port of entry detection techniques, including sniffer dogs, X rays and traveler profiling.

**Assignment 13. (10 points).** *Reading of assigned material and answer the questionnaire.* **Due date:** Mar. 04, 2014.

### **Lecture 15- Mar 06-Week 8**

Diagnostics vs. detection, concepts and other related terms. Principles of common diagnostic methods and diagnostic strategies. Serological and molecular methods for detection and diagnostics of incursion pests, and diseases. Trends in diagnostics and diagnostic research in biosecurity. Classic vs. molecular diagnostics? The diagnostic laboratory.

**Assignment 14 (10 points)** *Reading of assigned material and answer the questionnaire.* **Due date:** Mar. 06, 2014.

### **Lecture 16- Mar 11-Week 9 (10 points)**

5<sup>th</sup> Guest speaker. **Dr. Trena Blagden,** OSU NIMFFAB. Laboratory quality control and types of

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accreditation. Rigor and characteristics of detection and diagnostic procedures. Standard operational procedures (SOPs).

**Assignment 15. (10 points).** *Reading of assigned material and answer the questionnaire. Due date:* Mar. 11, 2014.

### **Lecture 17- Mar 13-Week 9 (10 points)**

6<sup>th</sup> Guest speaker. A CSI case analysis, by Ian Moncrief.

**Assignment 16. (10 points).** *Reading of assigned material and answer the questionnaire. Due date:* Mar. 13, 2014.

### **Spring Break-Mar 17 to 21-Week 10**

#### **Lecture 18- Mar 25-Week 11**

Microbial forensic, perspectives and needs. Initial investigation, (detailed) investigation and response. The relevance of tracking back. Risk analysis and rapid risk assessments. Elements of an incursion assessment report. Ramifications and costs associated with a new organism/invasive species outbreak.

**NO Reading or assigned material.** Study time granted for Examination 2.

### **2" examination-Mar 27-Week 11 (80 points)**

#### **Lecture 19-Apr 01-Week 12**

Laboratory demonstration & practice 1. Detection procedure using Immuno lateral flow devices & forensic DNA fingerprinting. Venue: The National Institute for Microbial Forensics & Food and Agricultural Biosecurity (NIMFFAB) laboratory at the Henry Bellmon Research Center. Assembly will be at the Lobby of the building 10:30 AM sharp.

**Assignment 17. (10 points).** *Laboratory report 1. Detection using a lateral flow device. Due date:* Apr. 01, 2014.

#### **Lecture 21-Apr 01-Week 12**

Laboratory demonstration & practice 2. Forensic DNA fingerprinting.

**Assignment 18. (10 points).** *Laboratory report 2. Detection using forensic DNA fingerprinting. Due date:* Apr. 21, 2014.

#### **Lecture 22-Apr 08-Week 13**

NIMFFAB Graduate Students symposium. Trends in microbial forensics & diagnostics research. Graduate students **Jon Daniels, Sharon Andreason, and Ian Moncrief** will share experiences, work visions and their research results in biosecurity and forensics sciences.

**Assignment 19. (10 points).** *Reading of assigned material and answer the questionnaire. Due date:* Apr. 08, 2014.

#### **Lecture 23-Apr 15-Week 13**

What makes Microbial forensic different than forensics, perspectives and needs. Initial investigation, (detailed) investigation and response. The relevance of tracking back.

#### **Lecture 24-Apr 10-Week 14**

Diagnostics networks & response. US Regulatory programs and prevention, rapid response and recovery; and targeting of newly introduced pests using specific technologies.

**NO Reading or assigned material.**

#### **Lecture 25-Apr 17-Week 14**

Active and passive surveillance. Outbreak delimiting surveys. National, regional or crop surveys and seasonal considerations. Decision making in biosecurity. Simulation exercises. Risk analysis and rapid

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risk assessments. Elements of an incursion assessment report. Ramifications and costs associated with a new organism/invasive species outbreak.

***NO Reading or assigned material.***

### ***Lecture 26-Apr 22-Week 15***

Bench top simulation exercise. Students will follow up a real case of domestic relevance. The exercise will begin with a presentation related to a selected commodity and problem. Final debriefing.

***NO Reading or assigned material.*** Study time granted for Examination 3.

### ***3'' examination-Apr 24-Week 15***

### ***Lecture 27- Apr 29 & Lecture 28 -May 01-Week 16***

'Loose' lecture slots. These lectures slots are reserved and scheduled to accommodate possible delay by inclement weather.

### **Program duration.**

Fifteen weeks program. *Last class work day is May 02, 2014.*