***Ensuring Food Safety: Role of Producers, Consumers, and Public Health Agencies*.**

Purpose of course: The course offers students an opportunity to gain insights into how the knowledge and expertise they acquire during their university studies can be applied to facilitating or enhancing efforts by public health agencies (local, state, national, and international), and by food producers, food manufacturers, food distributors and other pertinent industry, to ensure food safety.

Teacher: Henry E. Ekperigin, D. V. M., M. P. V. M., Ph. D. Dr. Henry Ekperigin is a Veterinarian with advanced training in Epidemiology, Nutrition, and as a specialist in Poultry Medicine. He possesses more than 30 years of professional experience in the public and private sectors, and in academia, as a clinician, consultant, teacher, and scientific reviewer and researcher of food-borne and nutrition-related diseases. Dr. Ekperigin’s major area of scientific interest is the epidemiology, prevention, and control of food-borne diseases caused by pathogenic microbes and their toxins. His main expertise is on *Salmonella*, and the prevention and control of human and animal salmonellosis. Dr. Ekperigin may invite other experts as guest lecturers.

Course book requirement: No book purchases required. Instead, students will be provided access to an electronic required reading list. In addition, students will be encouraged to independently conduct searches of literature for pertinent information.

Course Grades: Students will be graded based on their

a) Attendance in class, 15 %

b) Participation in class discussions, 15 %

c) Oral presentation to class, 30 %, and

d) Term paper, 40 %.

Course schedule & syllabus

**For Spring 2013 Semester (January 10 – April 18, 2013):**

Class times: Thursdays, from 6:00 PM – 9:00 PM

Office hours: Thursdays, from 4:45 PM – 5:45 PM; other times by appointment.

Course syllabus:

**Week # 1 – Thursday, January 10, 2013:**

* Course overview.
* Life; Basic life processes
	+ organic; inorganic
	+ animate; inanimate
	+ Alive (breathe, eat, move, grow, reproduce): plants, animals; Not alive: minerals, water, dead organisms.
* Live organisms – unicellular; multicellular.
* Live unicellular plants (e. g., diatoms) and unicellular animals (e. g., amoeba) – similarities, differences, and inter-relationships
	+ respiration
	+ nutrition
	+ growth
	+ response to stimuli
	+ locomotion
	+ reproduction (sexual and asexual)

**Week # 2 – Thursday, January 17, 2013:**

* Review of material covered during week # 1.
* Live multicellular plants: aquatic (e. g., water hyacinth, lotus, mangrove, etc) and terrestrial (e. g., grasses, legumes, shrubs, trees).
	+ Basic multicellular plant nutrition and growth.

**Week # 3 – Thursday, January 24, 2013:**

* Review of materials covered during week #s 1 & 2.
* Live multicellular plants (contd.):
	+ Basic multicellular plant reproduction: species propagation; variants

+ Flowers – pollination (self/cross)

+ Seeds, fruits, tubers

* Plants as food.

**Week # 4 – Thursday, January 31, 2013:**

* Review.
* Live multicellular animals: aquatic (crustaceans, mollusca, fishes, etc) and terrestrial (insects, birds, reptiles, mammals – herbivores, carnivores, omnivores)
	+ Basic multicellular animal nutrition and growth.

**Week # 5 – Thursday, February 7, 2013:**

* Review.
* Live multicellular animals (contd.):
	+ Basic multicellular animal reproduction: species propagation; variants

+ Coitus, fertilization, pregnancy, parturition

+ Nutrient package for developing embryo or newborn - Eggs, Honey, Milk

* Animals as food.
* Animals as pets.

**Week # 6 - Thursday, February 14, 2013:**

* Review.
* Production of plants as food for humans; as food for other animals
	+ Cultivation, harvesting, processing: then and now

+ Fertilizers, herbicides, pesticides, contamination, cross-contamination.

* Manufacture and storage of foods derived from plants
	+ Further processing, by-products

+ Substances generally recognized as safe (GRAS), food additives

+ Packaging, preservatives, temperature control, contamination, cross-contamination.

**Week # 7 – Thursday, February 21, 2013:**

* Review.
* Distribution of foods derived from plants
	+ Transportation, warehouses, retail establishments

+ Contamination, cross-contamination, temperature control

* End-user handling, storage, and consumption of foods derived from plants
	+ Homes (humans and pets), restaurants, livestock farms, petting zoos

+ Contamination, cross-contamination, temperature control

**Week # 8 – Thursday, February 28, 2013:**

* Review.
* Production of animals as food for humans; as food for other animals
	+ Birth, rearing, harvesting, slaughter and initial processing – poultry, livestock: then and now

+ Immunizations, insecticides, rodenticides, medications, manure management, contamination, and cross-contamination.

**Week # 9 – Thursday, March 7, 2013:**

* Review.
* Manufacture and storage of foods derived from animals
	+ Further processing, by-products

+ Substances generally recognized as safe (GRAS), food additives

+ Packaging, preservatives, temperature control, contamination, cross-contamination.

* Distribution of foods derived from animals
	+ Transportation, warehouses, retail establishments

+ Contamination, cross-contamination, temperature control

* End-user handling, storage, and consumption of foods derived from animals
	+ Homes (humans and pets), restaurants, livestock farms, petting zoos

+ Contamination, cross-contamination, temperature control

**Week # 10 – Thursday, March 14, 2013:**

* Review.
* Food safety as a core public health issue: Food-borne diseases and toxicoses:
	+ Bacteria (e. g., *Salmonella*, *E. coli*, *Listeria*, *Campylobacter*, *Clostridium*); antibiotic resistance.
	+ Pathogenic fungi and their toxins (e. g., Aspergillus spp., Fusarium spp., etc).
	+ Heavy metals (e.g., mercury, arsenic)
	+ Toxic chemicals
* Federal food safety regulations; Agencies responsible for enforcement
	+ United States Food and Drug Administration - FDA (all foods except meats, poultry, and processed egg products).
	+ United States Department of Agriculture - USDA (meats, poultry, and processed egg products).
	+ [United States Environmental Protection Agency - EPA (drinking water)].
	+ Interagency cooperation and collaborations
* Regulation of Food Safety by the FDA
	+ Pertinent laws: Federal Food, Drug, and Cosmetic Act, and the FDA Food Safety Modernization Act; histories.
	+ Enabling regulations: Code of Federal Regulations, Title 21.
	+ Approach/Strategy for implementation of regulations:

+ Prevent food safety problems.

+ Conduct surveillance and enforcement.

+ Initiate quick response to, and effectively control, food safety problems if and when they occur.

**Week # 11 – Thursday, March 21, 2013:**

* Review.
* Oral Presentations by students.

**Week # 12 – Spring Break March 25-29, 2013; NO CLASS**

**Week # 13 – Thursday, April 4, 2013:**

* Review.
* FDA regulation of *Salmonella* as an example of the Agency’s three-pronged approach/strategy for implementing food safety regulations - 1) Prevention of occurrence of problems; 2) Surveillance and Enforcement; and 3) Control or Elimination of problems:
	+ FDA’s establishment and use of HACCP, food additive petitions, and similar procedures, as tools for preventing the occurrence or outbreaks of food-borne *Salmonella* infection and disease.
	+ FDA’s establishment and use of compliance policy guides, import alerts, and sample collection and testing as tools for ensuring that food producers, manufacturers and distributors are taking and/or have taken appropriate action to prevent the occurrence or outbreaks of food-borne *Salmonella* infection and disease. Issuing warning letters, seeking injunctions, or initiating other legal actions to enforce the law.

**Week # 14 – Thursday, April 11, 2013:**

* Review.
* FDA regulation of *Salmonella* as an example of the Agency’s three-pronged approach/strategy for implementing food safety regulations (contd.):
	+ FDA’s establishment of an organizational structure (nationwide – regional/district offices/laboratories; international offices) that facilitates quick response to reports of occurrences or outbreaks of food-borne *Salmonella* infection and disease, and enables the Agency to conduct investigations, alone or in collaboration with other public health agencies, to determine the source of the problem and initiate corrective measures (recalls, seizures, etc).

**Week # 15 – Thursday, April 18, 2013:**

* Review.
* FDA regulation of Tissue Residues as an example of the Agency’s three-pronged approach/strategy for implementing food safety regulations:
	+ FDA’s establishment of New Animal Drug Applications, Investigational New Animal Drug Applications, and similar procedures to ensure the safe use of drugs and prevent the accumulation of deleterious levels of residues of antibiotics and other drugs in edible meats and poultry.
	+ FDA conducting surveillance in collaboration with the USDA and State public health agencies to ensure that livestock and poultry producers are taking and/or have taken appropriate action to prevent the accumulation of deleterious levels of residues of antibiotics and other drugs in edible meats and poultry. Issuing warning letters, seeking injunctions, or initiating other legal actions to enforce the law.
	+ FDA’s response to reports of occurrence of illegal residues of antibiotics and other drugs in edible meats and poultry by conducting investigations, alone or in collaboration with other public health agencies, to determine the source of the problem and initiate corrective measures.
* Students turn in their Term papers.
* Wrap-up.