

One Health: Concepts and Applications (MMD-898)

Credit Hours 3 (3-0)

Course Description

One health is a global drive fueled by threat of highly pathogenic global pandemics of diseases. It is recognition that the complex health challenges faced in the 21st century required a new interdisciplinary approach to study complex interactions between human health, animal health and ecosystem. The One Health approach recognizes the relationship between health and disease at the human, animal and environment interfaces and has become an important focus in both medical and veterinary science. It promotes a “whole of society” treatment of health hazards and a systemic change of perspective in the management of risk.

Emerging infectious diseases such as Zika, Ebola, West Nile Virus, and avian/swine influenza have focused attention on infectious diseases that cross between animals and human beings; many of these diseases are manifestations of important environmental changes related to land use, climate change, intensification of food production, and other factors. Therefore, preventing such diseases must involve creating and maintaining healthy environments. Working to improve such environments is a complex process that involves both professionals and communities.

One-health thinking is strongly endorsed by prominent supporters of the One Health concept including the US CDC, NIH, USDA, and many academic and professional organizations. Thus, it is important that students should get familiarized with One Health concept so that they can be better equipped with a thorough understanding of one health concept which can be practically implemented in action-based research aimed at improving health conditions.

Educational Objective

At the end of the course students will be able to:

- Understand the One Health concept and approach problem solving using a trans-disciplinary methodology
- Understand the origin, context and drivers of infectious disease at the human, animal and environment interface

- Evaluate impacts of multi-host infections on human, animal and ecosystem health and economics directly, or indirectly, via food, disease vectors or the environment.
- Develop a One Health systems approach to complex disease issues in monitoring, surveillance, diagnosis, prevention and control
- Critically review published literature
- Design a research project

Course Outcomes

- Enable students to develop competence in very specific health skills.
- The course offers depth in how infectious diseases are transmitted at the human-animal interface; how the environment impacts such disease transmission; and how we can predict and mitigate new and current disease threats.
- An emphasis is placed upon agricultural industries, biosecurity, entomology, zoonotic diseases, animal health, pathogen detection, and environmental controls.

Course Contents

1. Theoretical Foundations

- The concept of integrated One Health Services
- One Health in history
- One health as global drive
- Concept pillars of one health
- Benefits of a closer integration between human, animal and plant health

2. Human animal interface:

- Human-animal relationship
- Animals as sentinels of health hazards,
- Crossing specie barriers
- Molecular basis of crossing species barrier
- Emerging zoonotic infectious diseases
 - viral zoonosis
 - bacterial zoonosis

- parasitic zoonosis/entomology
3. Human environment interface:
 - Environmental Health Concepts
 - Characteristics of population and population change
 - Population growth
 - Factors affecting population growth
 - An ecological and conservation perspective
 - Aquatic Systems/ Water Quality and Environmental Health
 4. Animal environment interface:
 - Animals as sentinels of environmental hazards,
 - Wildlife and environment relationship
 - livestock and environment relationship
 5. Non-communicable diseases: role of companion animals in non-communicable diseases (coronary heart disease, obesity, diabetes and depression)
 6. Laboratory Methods for One Health
 - Introduction to Principles of Epidemiology
 - Integrated human and animal demographic surveillance
 - designing of surveillance protocols
 - Diagnostic of zoonotic infections
 7. Safety issues
 - Occupational health/safety issues among health care professionals
 - Occupational & Environmental Health among Agriculture Workers
 8. Integrating global health governance with national priorities in a globalized world
 9. One Health in policy development: an integrated approach to translate science into policy
 10. Capacity building, public engagement and conceptual outlook

Recommended Books

1. Behraves, C. B. (2016). One Health: People, Animals, and the Environment.
2. Yamada, A., Kahn, L. H., Kaplan, B., Monath, T. P., Woodall, J., & Conti, L. (Eds.). (2014). *Confronting Emerging Zoonoses: The One Health Paradigm*. Springer.

3. Orcutt, C. (2014). Zoobiquity: The Astonishing Connection Between Human and Animal Health. *Journal of Exotic Pet Medicine*, 23(3), 305-307.
4. Mackenzie, J. S., Jeggo, M., Daszak, P., & Richt, J. A. (Eds.). (2013). *One Health: the human-animal-environment interfaces in emerging infectious diseases* (Vol. 366). Berlin: Springer.