

Title of Clerkship: Veterinary Medicine at The Toledo Zoo and Aquarium

Elective Years: 4th Year

Department: Department of Medical Education

Type of Elective: Clinical Non-Clinical/Research Basic Science

Clerkship Site: The Toledo Zoo and Aquarium

Course Number: MDED 703

Blocks Available: All

Number of Students per Block: 1

Faculty: Dennis Michels, Genevieve Dumonceaux

Elective Description/Requirements:

The Veterinary Clerkship at The Toledo Zoo and Aquarium is a 2-week clinical experience during which students will obtain experience in the field of veterinary medicine, and its application in the practice of human medicine. The clerkship aligns with the One Health concept which is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals, and the environment. This clerkship will particularly place emphasis on common zoonotic infections, comparative anatomy, and the importance of collaboration between medical professionals in response to disease. This clerkship will provide students with a holistic medical experience before they begin residency training.

Students will spend their rotation working with the veterinary staff and assisting in the animals' care (see details below for daily schedule). The student will spend mornings on rounds with the veterinary staff using active clinical cases and post-mortem examination to understand basic concepts of animal anatomy, physiology, and pathology. This will be used to enhance their understanding of human-animal interactions, disease transmission, and differences in clinical signs between people and animals. Hands-on examination with animals will depend on species and human/animal safety. In the afternoon, students will spend their time in guided study and discussion. Topics will include anatomical & physiological characteristics of major animal taxa, zoonotic diseases, and One Health concepts/examples. Daily reading assignments may be modified to coincide with current casework. On the final afternoon, the student will give a short (5-10 minute) presentation on a zoonotic disease, case, or important One Health concept (approved by veterinary staff the previous week). Grade (pass/fail) will be assigned on achievement of clinical objectives.

Length of Clerkship: 2 weeks (40 hours/week)

Educational Course Objectives/Core competencies:

At the end of this clerkship the student should be able to:

1. Explain how zoonotic diseases directly impact human health (MK-1).
2. Explain the physiology of health and disease associated with each case (MK-3, MK-4).
3. Perform a detailed physical examination of various species. (PC-1, MK-1)

4. Explain how the clinical presentation of different veterinary illnesses compares to a similar illness in a human. (PC-6, PC-7, MK-1, MK-5, MK-10)
5. Generate an appropriate differential diagnosis for each veterinary problem identified in clinical context. (MK-3)
6. Identify and utilize appropriate diagnostic tests (such ultrasound, X-ray, and laboratory tests) in different clinical scenarios. (PC-7, PC-8)
7. Describe a holistic approach to patient care that emphasizes respect and appreciation for life in all its forms (SBP-5, MK-16, PC-11, PB-1, PB-4, PB-5, PB-6)
8. Obtain and present veterinary literature that supports the care and management of the animals for whom you are caring. (MK-7, PC-10, PBL-4, PBL-5)

Professionalism: UTCOMLS students will meet or exceed the institutional standards for professionalism as stated in the current Educational Program

Instructional Methods:

Lecture
Demonstration
Clinical experience -- inpatient
Tutorial -- Online module
Small group discussion
Self-directed learning

Evaluation Methods:

Self-assessment -- student will write a one-page reflection paper
Participation
Clinical competency evaluation (pass/fail)

Prerequisites: Successful completion of Third Year

Clerkship Director: Viviana Ferreira DVM, PhD; Stephanie Mann MD, MS HPED

Site Director: Dennis Michels, DVM

Clerkship Coordinator: Erica Langlois
erica.langlois@utoledo.edu

Special requirements: none

Rotation readings and Discussion Schedule:

Day 1: Intro

- <https://www.youtube.com/watch?v=weXJBFai5Os>
- One Health: People, Animals, and the Environment. Atlas and Maloy. ASM Press 2014.
 - Chapter 1: Combating the Triple threat: The Need for a One Health Approach by LJ King
 - Chapter 2: The Value of the One Health Approach: Shifting from Emergency Response to Prevention of Zoonotic Disease Threats at Their Source by D Heymann and M Dixon
- Zoobiquity: The Astonishing Connection between Human and Animal Health. New York: Vintage 2013.
 - Chapter 1: Dr. House meet Dr. Dolittle: Redefining the boundaries of medicine

Day 2: Comparative Anatomy: Mammals

- Adams, B. J., & Crabtree, P. J. (2009). Comparative skeletal anatomy: a photographic atlas for medical examiners, coroners, forensic anthropologists, and archaeologists. Springer Science & Business Media.
 - Chapter 3 – Human vs Cow
 - Chapter 12 – Human vs Cat
- Pasquini, C., Spurgeon, T. L., & Pasquini, S. (2007). Anatomy of Domestic Animals: Systemic & Regional Approach. Sudz Publishing.
 - Pages 270-272, The ruminant stomach
- Dierauf, L., & Gulland, F. M. (Eds.). (2001). CRC handbook of marine mammal medicine: health, disease, and rehabilitation. CRC press.
 - Chapter 9 Gross and Microscopic Anatomy
- Mitchell, M., & Tully, T. N. (2008). Manual of Exotic Pet Practice-E-Book. Elsevier Health Sciences.
 - Chapter 11 - Marsupials

Day 3: Comparative Anatomy: Birds

- Adams, B. J., & Crabtree, P. J. (2009). Comparative skeletal anatomy: a photographic atlas for medical examiners, coroners, forensic anthropologists, and archaeologists. Springer Science & Business Media.
 - Chapter 16 – Human vs Chicken
- Doneley, B. (2016). Avian medicine and surgery in practice: companion and aviary birds. CRC press.
 - Chapter 1 – anatomy and physiology

Day 4: Comparative Anatomy: Reptiles & Amphibians

- Divers, S. J., & Stahl, S. J. (Eds.). (2018). Mader's Reptile and Amphibian Medicine and Surgery. Elsevier Health Sciences.
 - Section 2 – Biology (Anatomy, Physiology, Behavior)

Day 5: Comparative Anatomy: Fish, Elasmobranchs, And Invertebrates

- Teleost (Bony fish) anatomy
- Elasmobranch anatomy
 - Smith, M., Warmolts, D., Thoney, D., Hueter, R., Murray, M., & Ezcurra, J. (2017). The Elasmobranch Husbandry Manual II.
- Cephalopod anatomy
 - Lewbart, G. A. (Ed.). (2011). Invertebrate medicine. John Wiley & Sons.
 - Chapter 6 - Cephalopods

Day 6: Overview of One Health Concepts

- Sustaining Life: How Human Health Depends on Biodiversity. Edited by E Chivian and A Bernstein. Oxford University Press 2008.
 - Chapter 7: Ecosystem Disturbance, Biodiversity Loss, and Human Infectious Disease by Molyneux et al.
- Daszak, P., Tabor, G. M., Kilpatrick, A. M., Epstein, J. O. N., & Plowright, R. (2004). Conservation medicine and a new agenda for emerging diseases. Annals of the New York Academy of Sciences, 1026(1), 1-11.
- Hosseini, P. R., Mills, J. N., Prieur-Richard, A. H., Ezenwa, V. O., Bailly, X., Rizzoli, A., ... & Guégan, J. F. (2017). Does the impact of biodiversity differ between emerging and endemic pathogens? The need to separate the concepts of hazard and risk.

Philosophical Transactions of the Royal Society B: Biological Sciences, 372(1722), 20160129.

- Zinsstag, J., Schelling, E., Waltner-Toews, D., & Tanner, M. (2011). From “one medicine” to “one health” and systemic approaches to health and well-being. *Preventive veterinary medicine*, 101(3-4), 148-156.

Day 7: Focused topic: Coronavirus and SARS-COV-2

- Yuen, K. S., Ye, Z. W., Fung, S. Y., Chan, C. P., & Jin, D. Y. (2020). SARS-CoV-2 and COVID-19: The most important research questions. *Cell & bioscience*, 10(1), 1-5.
- Andersen, K. G., Rambaut, A., Lipkin, W. I., Holmes, E. C., & Garry, R. F. (2020). The proximal origin of SARS-CoV-2. *Nature medicine*, 26(4), 450-452.
- Morcatty, T. Q., Feddema, K., Nekaris, K. A. I., & Nijman, V. (2020). Online trade in wildlife and the lack of response to COVID-19. *Environmental Research*, 110439.
- Turcios-Casco, M. A., & Gatti, R. C. (2020). Do not blame bats and pangolins! Global consequences for wildlife conservation after the SARS-CoV-2 pandemic. *Biodiversity and Conservation*, 29(13), 3829-3833.
- Cazzolla Gatti, R. (2020). The pangolin’s revenge: SARS-CoV-2 did not emerge from a lab but from wildlife exploitation. *GAIA-Ecological Perspectives for Science and Society*, 29(2), 79-82.

Day 8:

- Robinson, T. P., Bu, D. P., Carrique-Mas, J., Fèvre, E. M., Gilbert, M., Grace, D., ... & Laxminarayan, R. (2016). Antibiotic resistance is the quintessential One Health issue. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 110(7), 377-380.
- Palmer, G. H., & Call, D. R. (2013). Antimicrobial resistance: a global public health challenge requiring a global one health strategy. *NAM Perspectives*.
- Rulli, M. C., Santini, M., Hayman, D. T., & D’Odorico, P. (2017). The nexus between forest fragmentation in Africa and Ebola virus disease outbreaks. *Scientific reports*, 7, 41613.
- Hopkins, J., Alsop, J., Varga, C., Pasma, T., Jekel, P., Rishi, L., ... & Filejski, C. (2016). Investigation and management of psittacosis in a public aviary: A One Health approach. *Canada Communicable Disease Report*, 42(5), 112.

Day 9:

- Fitzpatrick, M. C., Shah, H. A., Pandey, A., Bilinski, A. M., Kakkar, M., Clark, A. D., ... & Galvani, A. P. (2016). One Health approach to cost-effective rabies control in India. *Proceedings of the National Academy of Sciences*, 113(51), 14574-14581.

- Wirblich, C., Coleman, C. M., Kurup, D., Abraham, T. S., Bernbaum, J. G., Jahrling, P. B., ... & Schnell, M. J. (2017). One-health: a safe, efficient, dual-use vaccine for humans and animals against Middle East respiratory syndrome coronavirus and rabies virus. *Journal of virology*, 91(2), e02040-16.
- Dantas-Torres, F., Chomel, B. B., & Otranto, D. (2012). Ticks and tick-borne diseases: a One Health perspective. *Trends in parasitology*, 28(10), 437-446.

Day 10:

- Student Presentation