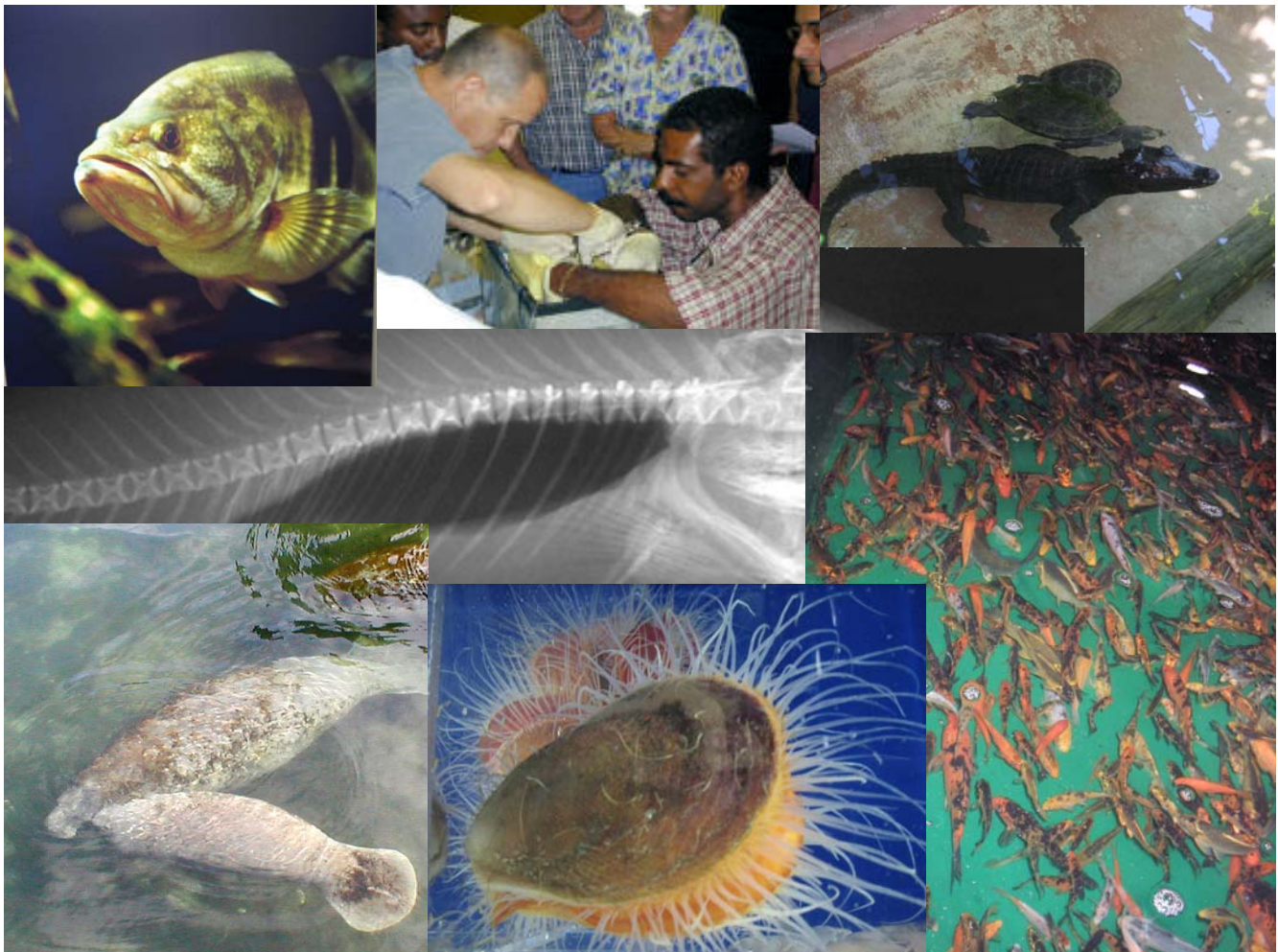


**UF** | **College of  
Veterinary Medicine**  
**UNIVERSITY of FLORIDA**

**University of Florida  
College of Veterinary Medicine  
Certificate in Aquatic Animal Medicine**



### **Certificate in Aquatic Animal Medicine**

The University of Florida has a very active aquatic animal health program that is a collaborative effort between the College of Veterinary Medicine, the Whitney Laboratory for Marine Bioscience, the Program in Fisheries and Aquatic Sciences (School of Forest Resources and Conservation, College of Agriculture and Life Sciences) and the Biology Department (College of Liberal Arts and Sciences). Partnerships with federal and state agencies, and other public and private aquatic institutions throughout the state further enhance the scope of the program, including USDA-APHIS-Veterinary Services, the Florida Fish and Wildlife Research Institute, Disney's Animal Kingdom, SeaWorld, the Florida Aquarium, and commercial aquaculture facilities, just to name a few. Florida's unique and diverse ecosystems, and broad academic programs, create a unique opportunity for veterinary students to receive specialized and directed training within the veterinary curriculum. The purpose of this certificate program is to identify and recognize veterinary students with an interest in aquatic animal health and provide guidance to them during their veterinary studies to help them develop a knowledge base in this specialty.

Aquatic animal medicine is a rapidly expanding specialty of veterinary medicine within the American College of Zoological Medicine (ACZM). Aquatic animal medicine emerged as a veterinary discipline in 1968 when the International Association for Aquatic Animal Medicine had its organizational meeting in Menlo Park, California. Since then the discipline has expanded considerably and today includes aspects of food supply veterinary medicine through aquaculture practice, zoological medicine with aquatic display animals, companion animal and wildlife medicine. Some training in aquatic animal medicine has been available to veterinary students at the University of Florida since the College of Veterinary Medicine accepted its first class in 1976. The program has experienced significant growth since 2000 when programs in marine mammal health, aquaculture and fish health were merged into a comprehensive aquatic animal health program. The certificate program described here is a broad educational program that gives veterinary students a unique opportunity to nurture their interest in this exciting and diverse field. This certificate program is the first of its kind and faculty members are anxious to work with motivated students to help them meet their career goals.

Students who successfully complete this program will receive a certificate that documents their concentrated training in aquatic animal medicine during their DVM curriculum. This certificate will identify the newly graduated veterinarian as an employment prospect for an entry level position in aquaculture, or a veterinary practitioner able to provide basic medical care to aquatic animals as part of a companion animal practice. Post-DVM training may include continued graduate education working towards a Masters or PhD degree, internships residencies or specialized clinical training in zoological medicine. Guidance from faculty can help veterinary students clarify career goals and pursue appropriate paths to achieve these goals.

The successful student in this program will be required to complete a total of 15 credits, which includes 9 credit hours of a core curriculum in aquatic animal medicine: Diseases of Warmwater Fish (VEM 5374, 3 credit hours), Sea Vet Clinical Training (VME 5378, 3 credit hours), Topics in Aquatic Animal Health (VEM 5931, 1 credit hour) and an externship (VEM 5892, 2 credit hours) or research project (VEM 5991, 2 credit hours) approved by program faculty. In addition, the student must complete 6 credit hours from a list of elective courses (included below). The student will be assigned a mentor from the aquatic animal health program faculty who will work with the student to select the elective courses most appropriate given the student's interests and career goals. Students who enter the veterinary program with undergraduate or graduate course work relevant to aquatic animal medicine may petition the faculty education committee within the program for up to 4 credits towards their certificate from some of their previous work. They may do so by submitting a formal letter to our program education committee, describing in detail the related work, any supporting information or letters of support, how it pertains to aquatic animal medicine and why these credits are needed to supplement course credits currently available through the program.

To participate in the aquatic animal medicine certificate program veterinary students must be in good academic standing and maintain a 3.0 GPA in the veterinary curriculum. If a student falls below a 3.0 GPA, his or her ability to participate in this program will be curtailed until the period of academic probation has been completed in a satisfactory manner. Applications for admission to the certificate program will be accepted no earlier than the spring semester of your freshman year in vet school, once fall grades of the previous semester have been released. Program applications can be found on our web page:

<http://aquatic.vetmed.ufl.edu/education/programs/aah-certificate/>. You will also need to fill out the application on the UF applications site: <http://www.admissions.ufl.edu/apply/more>. Go down the page until you see the Certificate options and choose “For currently enrolled UF students, **apply here**”. Follow the prompts to fill out information. This will put you into the UF ISIS system.

### ***The Core Curriculum in Aquatic Animal Medicine***

The core curriculum consists of entry level courses in fish and marine mammal medicine. These are Diseases of Warmwater Fish (VEM 5374, 3 credit hours) offered online during the summer C term and Sea Vet Clinical Training (VEM 5378, 3 credit hours) offered during the summer each year. Students who enter the College of Veterinary Medicine as freshman in the fall will be able to take these courses at the end of their freshman year. Online courses, such as Diseases of Warmwater Fish, will also be accepted the summer prior to entering the veterinary curriculum. Topics in Aquatic Animal Health is required as part of the core curriculum to cover critical evaluation and review of scientific literature within the field and is offered each fall and spring semester. In addition to this core course work, students will be expected to complete an externship (VEM 5892, 2 credit hours) **or** research project (VEM 5991, 2 credit hours) approved by the aquatic animal health faculty. An example template for completing course work is provided below.

### ***Descriptions of Core Courses:***

**Diseases of Warmwater Fish** (VEM 5374, 3 credit, letter grade) to be offered summer C, *fully online and asynchronous*. Diagnosis and management of diseases of warmwater fish. Emphasis on ornamental and display fish production with consideration of food and game fish, and fish health management within public aquaria. The course is intended for students in veterinary medicine and related disciplines as well as graduate veterinarians, aquaculturists, professional biologists and aquarists. It is excellent preparation for the American College of Zoological Medicine Day 1 examination in aquatic animal medicine. (\*Note, a separate hands-on lab component may be offered for an additional 1 credit in the summer)

**SeaVet Clinical Training** (VEM 5378, 3 credit, pass/fail; additional lab fees apply) offered in summer, this is a training program in marine mammal science and medicine. The curriculum will emphasize species native to Florida such as the manatee and small cetaceans. A segment on sea turtles, fish and sharks will also be included. The course is intended to serve as an introduction to aquatic animal medicine and husbandry, clinical techniques, and stranded animal management. Common health concerns of both free-ranging and captive populations will be discussed with emphasis on management and disease prevention. The course is intended for veterinary students and veterinarians with an interest in marine mammal medicine.

**Topics in Aquatic Animal Health** (VEM 5931, 1 credit, pass/fail; **max 3 credits**) Spring and fall semesters, one hour a week, 15 weeks. Presentation/discussion by students of selected articles relating to aquatic animal health, including both vertebrates and invertebrates; plus a monthly one hour seminar.

### **Students must choose ONE of the following to complete the core curriculum:**

**Individualized Investigation** (VEM 5991, 2 credit, letter grade) Students individually prepare an oral and written report on an aquatic animal health related research or clinical topic.

**Externships** (VEM 5892, 2 credit, Pass/Fail; **max 6 credits**) Students spend two weeks in a clinical or biomedical research experience at an approved aquatic animal facility.

Note that completing a research project (VEM 5991), publishing it and presenting it at a scientific meeting is **STRONGLY RECOMMENDED** for those students who may want to pursue a career in the zoo and public aquarium industry. The best time to do this work is during the first summer between freshman and sophomore year.

**Certificate Time Line:**

There is plenty of flexibility in how the requirements can be fulfilled throughout the four years. The table below is just an example. It is not recommended to take any electives during your classes freshman year or more than 1 credit during classes sophomore year. The best time to take externships is from junior spring semester through senior fall semester.

**Example Time-Line for Students Entering the Veterinary Curriculum in Fall Freshman Year:**

	2017			2018			2019			2020			2021			
	Fr			So			Jr			Sr						
<b>Core Courses</b>	F	Sp	Sm	F	Sp	Sm	F	Sp	Sm	F	Sp	DVM Credits	Certificate Credits			
SeaVet, VEM 5378			•									Elective 3	3			
Diseases of Warmwater Fish, VEM 5374									•			3	3			
Externship, VEM 5892									•			2	2			
Topics in Aq. An. Hlth, VEM 5931				•								1	1			
<b>Elective Courses</b>																
Marine Mammal Medicine, VEM 5377										•		Elective 1	1			
Aquatic Wildlife Health Issues VEM 5372								•				2	2			
Individualized Investigation, VEM 5991			•									2	2			
Externship, VEM 5892										•		2	2			
IAAAM conference								•				0	1			
<b>Total Credits</b>												<b>14</b>	<b>15</b>			

\*Note – Fr = Freshman, So = Sophomore, Jr = Junior, Sr = Senior, F = Fall, Sp = Spring, and Sm = Summer.

**Elective Classes in Aquatic Animal Medicine**

A broad range of elective course work is available from within the College of Veterinary Medicine as well as from other units on campus. The student and his or her mentor should work together to identify elective classes that are consistent with the student’s interests and career goals. A list of potential elective courses is provided below. Approval of aquatic animal health program faculty may be sought for relevant courses not on this list.

***Descriptions of Potential Elective Classes:*****PROFESSIONAL LEVEL** (on campus)

Through the College of Veterinary Medicine we offer: the courses listed below as well as some new ones that are currently under development. Veterinary students would not normally be required to pay additional tuition to participate in these courses.

**Marine Mammal Medicine** (VEM 5377, 1 credit, pass/fail) Fall of Senior year, to educate students in the basic science, husbandry, medicine and surgery of marine mammals. To understand the classification of mammals, special husbandry issues and management of species including medicine surgery and anesthesia. Course coordinator – Dr. Mike Walsh.

**PROFESSIONAL LEVEL:** (off campus)

**Externships** (VEM 5892, 2 credit, Pass/Fail; **max 6 certificate credits**) Students spend 2-6 weeks at an approved aquatic animal facility. A list of approved externships is available on the College of Veterinary Medicine web site. Approval of aquatic animal health faculty is required for the externship to count towards the certificate, and for students to apply for financial support from the aquatic animal health faculty.

**Aquatic Animal Conservation Issues** (VEM 5371, 2 credit, letter grade, \$50/cr DL fee) - to be offered Fall semester annually, *all on-line, asynchronous*. The goals of this course are to introduce students to some of the controversial issues surrounding the conservation of aquatic animal species ranging from invertebrates to marine mammals, with some emphasis on marine mammals, but including sea turtles, fisheries and marine ecosystems. Format includes heavy reading, discussion, homework assignments, and review of a journal articles.

**Aquatic Wildlife Health Issues** (VEM5372, 2 credit, letter grade, \$50/cr DL fee) – to be offered Spring term annually, *all on-line, asynchronous*. This course will introduce veterinary students to natural history, anatomy, physiology, behavior and health issues of aquatic wildlife, such as: marine mammals, sea turtles, crocodilians, fish and invertebrates. Students should be able to describe and differentiate between normal/unhealthy animals, and have a working knowledge of common health issues.

**Manatee Health and Conservation** (VEM5373, 2 credit, letter grade, \$50/cr DL fee) - to be offered Summer C annually, *all online, asynchronous*. The focus is to introduce veterinary students to manatee natural history, anatomy, physiology, behavior, conservation and health issues. Students will be exposed to these topics, introduced to current experts in these fields, be able to evaluate and describe common health and mortality issues, and explain current management strategies.

**Scientific Conferences (max 2 credits)** conference must be approved by the Aquatic Animal Health program education committee and include: International Association of Aquatic Animal Medicine (IAAAM), the Society for Marine Mammalogy Biennial Conference on the Biology of Marine Mammals, Eastern Fish Health Conference, Florida Marine Mammal Health Conference, etc... You may receive 1 certificate credit for attendance to a conference (15 hr lectures or more) for no more than two conferences or 2 certificate credits for attendance (15 hr lectures or more) and an oral or poster presentation at a conference. Ideally the timing of the conference should not overlap with any other DVM courses. However, if there is overlap the student must receive approval from all impacted course coordinators to miss class for conference attendance.

**ADDITIONAL COURSES:**

**Students may apply for certificate credit for courses they have taken as an undergraduate or graduate that may be relevant to aquatic animal health.** Students who enter the veterinary program with undergraduate or graduate course work relevant to aquatic animal medicine may petition the faculty education committee within the program for up to 4 credits towards their certificate from some of their previous work.

**Examples of undergraduate courses taught outside of the College of Veterinary Medicine which may be considered as electives towards the certificate in aquatic animal medicine:**

Zoology

**ZOO 4403C Field Problems in Marine Biology** *Credits: 4 to 6; Prereq: BSC 2011 and 2011L with a grade of at least C.* Survey of major marine taxa, systematics of local marine fauna and flora, with familiarization of the marine environment. Laboratory emphasizes field work and independent projects.

Wildlife Ecology and Conservation

**WIS 4443C Wetland Wildlife Ecology** *Credits: 4; Prereq: WIS 3401.* Ecological principles of conservation and management of wildlife in wetland environments, including a survey of the structure and function of major wetland types.

Soil and Water Science

**SOS 2007 The World of Water** *Credits: 3.* Course explores the full range of water issues including abundance and quality of water in the environment, water policy, and conflict.

**SOS 4307 Ecology of Waterborne Pathogens** *Credits: 3; Prereq: MCB 3020 or MCB 4203 or equivalent* Survival strategies, gene regulation and metabolism of waterborne pathogens. Methods for microbe detection and control.

Fisheries and Aquatic Sciences

**FAS 2024 Global and Regional Perspectives in Fisheries** *Credits: 3.* Fish biology, ecology and habitats relevant to fisheries on both a global and regional (Florida) scale. Follows the fisheries occurring from cold, mountain rivers to the depths of the oceans, with special topics (e.g., artificial reefs, fisheries bycatch and aquaculture). Intended for non-science and science majors. (B)

**FAS 4202C Biology of Fishes** *Credits: 4; Prereq: BSC 2011 and BSC 2011L.* Course will focus on the general biology of fishes, with emphasis on trends in their evolution, integrative and sensory biology, physiology, feeding ecology, reproduction, growth, and population dynamics as they relate to fisheries.

**FAS 4305C Introduction to Fishery Science** *Credits: 3; Prereq: refer to the department.* Principles of fish management in freshwater and marine systems. Includes field and laboratory techniques for aquatic habitat and fishery resource assessment, aquaculture practices and consideration of contemporary issues pertinent to sport and commercial uses of renewable fisheries resources.

**FAS 4405C Principles of Aquaculture** *Credits: 4; Prereq: BSC 2011 and BSC 2011L, or permission of instructor.* Culture methods of fish and shellfish, species selection, biological and environmental principles, case histories and future trends.

Veterinary Medicine

**VME 4906 Problems in Veterinary Science** *Credits: 1 to 3; Prereq: permission of instructor.* Studies and research, investigation of an approved aquatic animal health problem in the field of veterinary medicine. This may count as credits towards the Aquatic Animal Medicine Certificate if conducted with an appropriate faculty member and on a related topic.

**VME 4013 Aquatic Wildlife Health Issues** *Credits: 3; Prereq: Biology 1 & 2, plus 2 additional upper level biological science courses or instructor permission.* To be offered Summer C annually, *all on-line, asynchronous.* This course is designed as an introduction to the natural history, anatomy, physiology and behavior of aquatic megavertebrates: whales and dolphins, seals and sea lions, manatees, sea turtles and crocodylians. . **\*\*Note\*\*** This is the graduate student course number and name for the Aquatic Wildlife Health Issues VEM 5372 elective.

**VME 4010 Aquatic Animal Conservation Issues** *Credits: 3; Prereq: Biology 1 & 2, plus 2 additional upper level biological science courses or instructor permission.* To be offered Fall annually, *all on-line, asynchronous.* The course introduces students to some of the controversial issues surrounding the conservation

of aquatic animal species ranging from invertebrates to marine mammals, with some emphasis on marine mammals, but including sea turtles, fisheries and marine ecosystems. **\*\*Note\*\*** This is the undergraduate student course number and name for the Aquatic Animal Conservation Issues VEM 5371 elective.

**VME 4016 Manatee Health and Conservation** *Credits: 3; Prereq: Biology 1 & 2, plus 2 additional upper level biological science courses or instructor permission.* To be offered Summer C annually, all online, asynchronous. This course is designed to introduce students to the natural history, anatomy, physiology, behavior, conservation and health issues of manatees. **\*\*Note\*\*** This is the undergraduate student course number and name for the Manatee Health and Conservation VEM 5373 elective.

### **Graduate level courses at UF that may be related to Aquatic Animal Health**

#### Fisheries and Aquatic Sciences

**FAS 5203C—Biology of Fishes (4)** *Prereq: BSC 2011/2011L or consent of instructor.* Emphasis on trends in evolution, integrative and sensory biology, physiology, feeding ecology, reproduction, growth, and population dynamics as they relate to fisheries.

**FAS 5255C—Diseases of Warmwater Fish (3)** *Prereq: consent of instructor.* to be offered summer C, *fully online and asynchronous.* Diagnosis and management of diseases of warmwater fish. Emphasis on ornamental and display fish production with consideration of food and game fish, and fish health management within public aquaria. The course is intended for students in veterinary medicine and related disciplines as well as graduate veterinarians, aquaculturists, professional biologists and aquarists. (\*Note, a separate hands-on lab component will be offered for an additional 1 credit in the summer; this is the graduate student course number and name for the **Diseases of Warmwater Fish** VEM 5374 core requirement).

**FAS 5265—Reproductive Biology of Fish and Shell Fish (3)** *Prereq: courses in ecology and biochemistry, or consent of the instructor.* Ecological, behavioral, and physiological control mechanisms/ models of reproduction, and how they may be manipulated in fisheries and aquaculture. Offered spring semester.

**FAS 5276C—Field Ecology of Aquatic Organisms (4)** *Prereq: FAS 4305C or consent of instructor.* Understanding principles of fish and shellfish ecology through field studies. Intensive study in lakes, rivers, and coastal marshes to gain understanding of how fish and shellfish interact with their environment. Extensive field trips required. Offered summer semester.

**FAS 5335C—Applied Fisheries Statistics (4)** *Prereq: FAS 5276C or consent of instructor.* Population sampling and estimation, statistical assumptions and robustness, mark-recapture, growth, and empirical modeling of populations. Offered fall semester of even-numbered years.

**FAS 5901—Aquatic Research and Science (2)** General philosophical foundations of science and specific critiques and perspectives found in ecology and aquatic sciences. Offered spring semester of even-numbered years.

**FAS 6171—Applied Phycology (3)** *Prereq: undergraduate chemistry or biochemistry.* Ecology, management, utilization, and control of freshwater and marine algae and aquatic microorganisms. Overview of associated products, processes, and problems and economic implications. Offered fall semester of even-numbered years.

**FAS 6337C—Fish Population Dynamics (4)** *Prereq: STA 6166.* Analysis of fish populations for management purposes. Methods for estimating population parameters (e.g., growth, recruitment, and mortality. Use of population parameters and computer models to predict yield and catch composition, and bioenergetics approaches for fisheries management problems. Offered spring semester of odd-numbered years. )

**FAS 6355C—Fisheries Management (4)** *Prereq: FAS 5276C or consent of instructor.* Integration of scientific, social, political, and legal factors in fisheries management. Offered fall semester of odd numbered years.

**FAS 6932 – Introduction to Aquaculture (3)** This course is an introductory course designed to provide an overview of the field of aquaculture and the common groups cultured in the United States. Course objectives cover the basic principles of aquaculture including fish biology, culture system design, feeding, handling, water quality management, and common diseases.

**FAS 6938 – Fish and Aquatic Invertebrate Histology (3)** teaches basic interpretation of the normal histology (fixed tissue microanatomy and physiology) of fish, bivalves, and corals and introduces common histopathologic (disease) findings.

#### Public Health & Health Professions

**PHC 6301 – Aquatic Systems and Environmental Health (3)** will provide an overview of aquatic resources including oceans, estuaries, rivers, lakes, streams and ponds, with focus on respective biotic communities and environmental health. We will address the physical and chemical nature of water, and the hydrologic cycle in order to understand water and land usage, and an overview of contaminant effects in different ecosystems. The course will provide a taxonomic and ecological summary of aquatic biota, from algae and invertebrates to vertebrates and pathogens.

#### Soil and Water Science

**CWR 6537—Contaminant Subsurface Hydrology (3)** *Prereq: MAP 2302 or 4341 or equivalent; CGS 2420 or equivalent; SOS 4602C or ABE 6252 or CWR 5125 or 5127 or equivalent; or EES 6208 or equivalent.* Physical-chemical-biological concepts and modeling of retention and transport of water and solutes in unsaturated and saturated media. Applications of environmental aspects of soil and groundwater contamination emphasized.

**SOS 5242—Wetlands and Water Quality (3)** *Prereq: CHM 2040.* Introduction to natural and constructed wetland ecosystems with emphasis on problems associated with eutrophication and water quality. Hydrology, soils, and biogeochemistry. Also offered as distance education course.

**SOS 5245—Water Resource Sustainability (3)** Quantitative description of effects of human impacts on hydrologic ecosystems (aquifers, watersheds, coastal zones, lakes and wetlands). Case studies illustrate detrimental effects of unsustainable resource utilization and beneficial management strategies. Also offered as distance education course.

**SOS 6448—Biogeochemistry of Wetlands (3)** Biogeochemical cycles of carbon, nitrogen, phosphorus, sulfur, and redox cations in wetland soils and sediments, as related to their agronomic, ecological, and environmental significance. Also offered as distance education course.

#### Veterinary Medicine

**VME 6938—Topics in Aquatic Animal Health (1; max 3)** Presentation/discussion by students of selected articles relating to aquatic animal health, including both vertebrates and invertebrates; plus a monthly one hour seminar. Spring and fall semesters every year, one hour a week. **\*\*Note\*\*** This is the graduate student course number and name for the Topics in Aquatic Animal Health VEM 5931 core requirement.

**VME 6010 – Aquatic Animal Conservation Issues (3)** - to be offered Fall annually, *all on-line, asynchronous.* The goals of this course are to introduce students to some of the controversial issues surrounding the conservation of aquatic animal species ranging from invertebrates to marine mammals, with some emphasis on marine mammals, but including sea turtles, fisheries and marine ecosystems. Format includes heavy reading, discussion, homework assignments, review of a journal article, and a short grant proposal and review. **\*\*Note\*\*** This is the graduate student course number and name for the Aquatic Animal Conservation Issues VEM 5371 elective.

**VME 6011 – Aquatic Wildlife Health Issues (3)** – to be offered Summer C term annually, *all on-line, asynchronous.* This on-line course will provide an introduction to marine mammals, sea turtles and alligators. It will cover general aspects of natural history, behavior, anatomy, physiology, management, research and health issues. **\*\*Note\*\*** This is the graduate student course number and name for the Aquatic Wildlife Health Issues VEM 5372 elective.

**VME 6015 - Manatee Health and Conservation (3)** - to be offered Summer C annually, all online, asynchronous. This course is designed to introduce students to the natural history, anatomy, physiology, behavior, conservation and health issues of manatees. **\*\*Note\*\*** This is the graduate student course number and name for the Manatee Health and Conservation VEM 5373 elective.



Wildlife Ecology and Conservation

**WIS 5155C—Natural History of Amphibians and Reptiles (4)** *Prereq: WIS 3401 or ZOO 2303C.*

Systematics, morphology, biogeography, life history patterns, ecology, and conservation of caecilians, salamanders, frogs, crocodilians, turtles, lizards, and snakes. Weekend field trips required. Offered spring semester of odd-numbered years.

**WIS 5323C—Impact of Diseases on Wildlife Population (3)** *Prereq: WIS 3401 or equivalent.* Diseases of wildlife, with emphasis on their impact on avian and mammalian populations of North America.

**WIS 6444—Advanced Wetlands Ecology (4)** *Prereq: WIS 4443, SOS 4242, EES 6308C, or consent of instructor.* Examination of geology, hydrology, chemistry, flora, fauna, and ecology of major wetland systems in North America.

Zoology

**PCB 5307C—Limnology (4)** *Prereq: PCB 4044C, CHM 2046.* Biological, chemical, and physical dynamics of inland waters.

**PCB 6496C—Stream Ecology (4)** *Prereq: ENY 3005C, PCB 4044C or 3043C, CHM 2046, PHY 2054.*

Physical,

**PCB 6815—Hormone Regulation of Invertebrate Behavior (3)** Survey and analysis of invertebrate behaviors regulated by hormones. Invertebrates considered include arthropods, coelenterates, helminths, and molluscs.

**ZOO 6406—Biology of Sea Turtles (3)** All aspects of biology of sea turtles and how their biology affects their conservation.

**ZOO 6456C—Ichthyology (4)** *Prereq: ZOO 2203C.*

**ZOO 6931—Seminar in Marine Turtle Biology (1-2; max: 5)** *Prereq: permission of instructor.* Advanced topics in biology and conservation of marine turtles.

*Other courses may be appropriate and students are encouraged to discuss their academic background and professional goals with Aquatic Animal Health faculty when selecting electives for this certificate program.*

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