

The University of Findlay

College of Sciences

The mission of The University of Findlay is to equip our students for meaningful lives and productive careers.

Course Number: ASLA 437 Biomedical Engineering in Veterinary Medicine: Online

Credit Hours: 2 credit hours

Class Time/Place: Online

Prerequisites, Co-requisites and Course Description:

This course is an introduction to biomechanics and the use of prostheses with an emphasis on animal examples. Students learn how to use engineering principles and design processes to solve health problems and restore normal anatomical function and quality of life to animals. Students will start by studying the foundations of bioengineering, biomechanics, and joint loading and then apply these principles to understand animal prosthetic case studies. The course is repeatable with a maximum of 9 total credits provided the topics are unique.

Instructor: Erica Ward, DVM; Lauren Thomas,

Instructor Contact Information: Erica@loopabroad.com

Office Hours: upon request

Course Objectives:

The following Learning Objectives will be addressed or assessed as part of the course:

- **Remember** the names and characteristics of relevant bones, joints, connective tissues, and organ systems relevant to prosthetics
- **Remember** the phases of the gait cycle, the joint forces, and common problems with injuries and ineffective prosthetics
- **Understand** the similarities and differences between applying prosthetic design principles to human and veterinary patients.
- **Understand** how to select materials for prosthetic and orthotic interventions in human and veterinary medicine based on the material properties and design requirements
- **Understand** the scope of wildlife medicine, including the use of advanced technologies and creative therapies in addressing a range of ailments.
- **Understand** and **Apply** culturally and economically responsive prosthetic decision-making skills
- **Understand** and **Apply** One Health principles, including using multiple disciplines to consider the use of prosthetics in wildlife and conservation contexts
- **Analyze** basic biomechanical principles as it relates to limb replacements or assistive devices used in human and veterinary medicine.

- **Evaluate** actual prosthetic devices and determine advantages, disadvantages, and points of failure
- **Evaluate** appropriate and inappropriate candidates for prosthetic and orthotic interventions in human and veterinary medicine.
- **Create** your own prosthetic and assistive device designs to help with musculoskeletal deformities and injuries

Required Textbooks and Other Materials: All required texts will be provided in the online modules.

Recommended Text:

Chui, Kevin and Milagros Jore, Sheng-Che Yen, and Michelle M Lusardi. Orthotics and Prosthetics in Rehabilitation. Saunders; 4th edition (2019).

Instructional Strategies:

Case Analysis	x	Library and Internet Research	
Debate		Practice/drill	
Discovery/Independent Research		Problem-solving	x
Discussion/Questioning/Interviewing		Reading assignments	
Experiential Learning		Role-playing/simulation games	
Field Experience		Service Learning	
Group Presentation		Video/Audio Review and Critique	
Laboratory Experiences		Other	
Lecture	x		

Methods of Assessment: Your course grade will be determined as follows:

Abstracts		Participation	
Attendance		Peer Evaluation	
Capstone Project		Portfolio	
Case Study		Portfolio Lab Performance	
Exams	x	Presentations	
Group Projects		Professional Evaluation	

Homework Assignments	x	Quizzes	x
Internet Research		Research project	
Journaling		Other	
Lab Performance			
Oral/written review of literature			

Grading: Your course grade will be determined as follows:

This course is composed of 31 modules. Each module will contain a pre-recorded lecture(s) covering principles of prosthetic design and often including case details from actual patients with prosthetic/orthotic treatments. There are 9 quizzes throughout the course and a final exam and final project at the end of the course. Your final course grade will be determined by quizzes and final exam grades.

Quizzes: 40%
 Final Project: 30%
 Final Exam: 30%

Grading Scale/Distribution:

<u>Grade</u>	<u>Points</u>	<u>Grading Scale</u>
A	4.00	93-100
A-	3.67	90-92
B+	3.33	87-89
B	3.00	83-86
B-	2.67	80-82
C+	2.33	77-79
C	2.00	73-76
C-	1.67	70-72
D+	1.33	67-69
D	1.00	63-66
D-	0.67	62-60
F	0.00	below 60

U	0.00	
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University Honor Code:

Each and every student of the University will adhere to the following Honor Code:

"I will not knowingly engage in any dishonorable behavior, cheat, steal, lie, or commit any act of plagiarism during any academic work, course, or endeavor. If I observe an act which I believe violates the University's Honor Code, I may, at my discretion, report it to the appropriate personnel."

Student Acknowledgement of University Honor Code:

"I acknowledge that I have fully complied or will comply with all aspects of the University's Honor Code in submitting this work."

Student Rights and Responsibilities Statement, Article VIII-Academic Integrity:

<http://catalog.findlay.edu/en/current/Undergraduate-Catalog/Student-Rights-and-Responsibilities-Statement/VIII-Academic-Integrity>

University Diversity Statement:

As part of our commitment to achieve excellence, the University of Findlay values and actively promotes a welcoming and supportive environment that honors the many aspects of diversity. We aspire to foster acceptance of, respect for, and appreciation of all persons in our campus community. We celebrate our commonalities and unique differences, and we acknowledge that diversity broadens learning, stimulates creativity, promotes the exchange of ideas, and prepares our students for meaningful lives and productive careers.

Course Policies and Practices:**Attendance and Participation Policy**

Students are expected to attend all class meetings for which they are registered. This is regarded as a matter of individual student responsibility. The only excused reasons for absences will be illness that impairs the ability to attend and function within the classroom setting or an unavoidable personal emergency.

Students are expected to attend all class sessions on all days of class. It will be the responsibility of the student to contact the course instructor or site director, preferably before the absence, to provide the appropriate documentation and verification for the reason for the absence, and to make arrangements with the course instructor for missed work. Students are responsible for all missed class material. Students may be subject to limited participation in hands-on practice at the instructor's discretion if they have missed the underlying material needed to safely perform the task at hand.

Final Exam Date: TBD

Special Services: If you are a student with a disability, it is your responsibility to inform your instructor and register with the Office of Disability Services (ods@findlay.edu) at least one week prior to a needed service so reasonable accommodations can be made.

Course and Instructor Evaluation: Each student is expected to complete the course and instructor evaluation which is sent electronically to the student by the Office of the Registrar. The electronic notification comes in the form of an e-mail from the UF Registrar's Office with the following subject line: Online survey for the designated course (e.g., BIOL 102).

Last Date of Attendance Policy: Instructors are required to indicate the last known date of attendance when a final grade of "F" or "U" is assigned to a student.

Module Topics:

- Introduction to Living Tissues
- Muscles, Nerves, and Integument
- Joints & Motion
- Canine Anatomy and Physiology
- Elephant Anatomy
- Biomechanics
- Gait
- Muscle Activity during the Gait Cycle
- Canine Gait Analysis
- Commonly Treated Canine Pathologies
- Materials Science
- Amputation, Limb Salvage, and Prosthetic Decision Making
- Prosthetic Evaluation and Casting
- Prosthetic and Orthotic Fabrication
- Human Upper Extremity Prosthetics
- Lower Extremity Prosthetics: Transtibial Socket Design and Considerations
- Human Lower Extremity Prosthetics: Transfemoral Design and Considerations
- Prosthetic Componentry
- Prosthetics: New Horizons
- Orthotics & Assistive Devices
- Orthotic & Prosthetic Maintenance
- Veterinary Applications of Orthoses and Assistive Technology
- Pathological Gait Analysis
- Prosthetic Gait Analysis
- Rehabilitation
- Biomimicry
- Cultural Perspectives on Disability and Prosthetics
- Sea Turtle Prosthetics
- Achilles the Rhino and his Prosthetic Leg
- Oral Prosthesis in Veterinary Applications
- Masha the Elephant with a Prosthetic Leg

