

Instructor - Dr. Ted Uyeno

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Hours -

Office: TBA (or by appointment)

Course: Lecture – MWF noon – 12:50pm, BSC 2022

Lab – F, 8:30-11:20am, BSC 1043

Textbook – Vogel, S. 2013. Comparative Biomechanics: Life's Physical World (2nd ed.) **Laboratory** – Course information and links or references for lab and supplementary readings will be posted on Blazeview.

Course Description: This course applies engineering and physics principles to understand how aquatic, terrestrial and aerial organisms function. Integrated lectures and labs explore the limitations and opportunities the physical world provides to organisms. Some topics that we will touch on include; how flies fly, how bones break, how tendons and muscles work, why mucus is so sticky and how to design patentable biomimetic solutions.

Pre-Requisite: BIOL1107-1108 or instructor permission, and PHYS 1111K or 2211K.

Attendance: MANDATORY! Please note: 1) I track of attendance. 2) Disruptive students will be asked to leave. 3) **NO** electronics/earphones are allowed in **lecture or laboratory**. Viewing a cellphone during a quiz or exam will be treated as an instance of **CHEATING**. 4) Those wishing to use laptops/iPads as part of the class are required to sit in the first row of the classroom. Viewing anything other than course work during course time is prohibited. Any of these violations may result in the loss of one **LETTER GRADE** from your final grade. Students missing 20% of the lectures will receive a grade of “F” **regardless** of standing.

Students with Documented Disabilities: I wish to teach everyone; students needing accommodations should contact me at the beginning of the semester. Students may need to register with the Access Office for Students with Disabilities (Farber Hall, 245-2498).

Assessment: The **lecture grade (350 pts)** is composed of *two exams (50 pts each), four graded assignments (50 pts) and participation/attendance grades (50 pts)*. An optional makeup exam will be offered during the final that can take the place of the lowest exam or assignment. The **lab grade (250 pts)** is composed of *two multi-week lab assignments (75 & 125 pts) and a final presentation (50 pts)*. The final grade will be out of 600 points.

Grade Scale: **90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D, <60 = F**

Biol 6010: A research paper worth 10% of the overall grade will be required from grad students. The paper will survey relevant biomechanical phenomena related to thesis topics/organisms.

Privacy Act: The FERPA Privacy Act does not allow me to discuss grades over the phone, sent to non-VSU email addresses, or be given to friends or relatives.

Cheating: Refer to the Student Code of Ethics in the Valdosta State University Student Handbook. A student caught cheating will be penalized or ejected. I give no first warnings.

Important Dates: Mid-Term – TBA, Final Exam – TBA

*** The Instructor reserves the right to modify the above contents with prior notification.**

BIOL 4010/6010
Comparative Biomechanics
Dr. Ted Uyeno

Tentative Lecture Outline - This is the order in which we will cover topics.

TOPIC	TEXT CHAPTERS
Size Shape and Scale	1,2,3
Introduction to Fluid mechanics	4,5
Viscosity	6
Forces of flow	7
No-slip condition (solid/fluid interfaces)	8
Circulatory systems and other plumbing	9,10
Reynolds numbers	11
Swimming and flying	12, 13, 14
Midterm exam	
Properties of biological materials	15,16
Rigid materials	17
Viscoelastic materials	18
Simple structures	19,20
Soft structures	21
Biological structural systems	22
Motility and mobility	23
Biological motors and transmissions	24
Land locomotion	25
Integration across levels of organization	TBA
Evolution, functional morphology, and bioinspired design	TBA
End of term exam	
Final Exam	

Lecture Exams:

- 1 – TBA
- 2 – TBA

Final Exam:

Lecture – TBA

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Tentative Lab Schedule - This is the order in which we will cover topics.

DAY	TOPIC	TECHNIQUE
1	Intro to Bioinstrumentation	Light/microphotography
2	Kinematics	X-ray/HiSpeed imaging
3	Flow visualization	Velocimetry
4	Material properties	Force/displacement
5	Electronic instruments	Electronics workshop
6	Rapid prototyping	CAD/CAM
7	Froud numbers	
8	Egg design	Paper 1 due
9	Mechanisms	
10	Joints	
11	Scientific writing	
12	Presentation preparation	
13	Student presentations	Paper 2 due
14	Student presentations	
15	Thanksgiving	
16	Wrap-up!	

Project 1 (Techniques paper, 75 pts)
Project 2 (Biomechanics paper, 125 pts)