This syllabus is a general representation of the course as previously offered and is subject to change.

BIOL 325 – Introduction to Animal Mechanics and Locomotion

General Course Syllabus (as of September 2019)

About the Course:

Course Description: This course introduces the concepts of biomechanics: the study of biological problems through the application of mechanical and engineering principles. It will cover the properties and function of biological materials (e.g. functional design of skeletal lever systems), effects of organism size, and different forms of animal locomotion, with a particular emphasis on vertebrates and on flying and swimming.

Course Format: Lecture
Credits: 3
Pre-requisites: BIOL 121

Course Learning Objectives:

By the end of this course, students will be able to:

- Build a foundation in basic physics and engineering principles used in comparative biomechanics.
- Explain the mechanics of biological materials, swimming, flying, and terrestrial locomotion.
- Apply concepts of Newtonian mechanics, scaling/allometry of biological systems, properties of biological materials, and fluid dynamics to describe, perform calculations, and predict the functional design of biological systems.

Textbooks and Additional Resources:

Recommended Text: Comparative Biomechanics: Life's Physical World, 2nd edition, Steven Vogel, Princeton Univ. Press.

Canvas: Canvas is the main port of call for communication in this course. All important course information will be posted here, along with lecture slides, practice questions, and links to relevant online material. Please check the announcements tab REGULARLY for updates/info. This is where students will be alerted to any changes to class schedules, updated course information, and answers to common questions.

Evaluation:

Assessment	Weight
Midterm 1	25%
Midterm 2	25%
Final	50%

Schedule of Topics:

Below is a sample schedule of topics from 2018W (subject to change):

Week	Topic
1	Introduction to, and history of, biomechanics The language of biomechanics
2	Forces, levers, and skeletons Muscles Muscles II
3	Scaling I Scaling II Material properties I: solids
4	Material properties II: fluids Bernoulli I Bernoulli II
5	Reynolds number Life in low vs high Reynolds number **Midterm exam 1**
6	Flow and drag Fluid flow II pressure coefficients and drag
7	Friction drag and pressure drag Intro to flight and lift Generation of lift and thrust
8	Wing loading Gliding flight I Gliding flight II
9	Flapping flight Flight I: using environmental energy **Midterm exam 2**
10	Hovering flight Insect flight Introduction to swimming
11	Fish swimming: momentum transfer Body and caudal fin swimming
12	Medial and paired fin swimming I Medial and paired fin swimming II Jetting propulsion
13	Swimming insects Cost of transport Pre-final study session

University Policies:

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.

> *UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.*
>
> *UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.*
>
> *UBC values academic honesty and students ae expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.*

Details of the policies and how to access support are available on the UBC Senate website.