

IB 411 AL1 FA21: Bioinspiration (Alleyne, M)

Syllabus

Course Description

This fully online, 8-week course focuses on how experts in biology and technological fields find inspiration in nature and use it as a model to make technological innovation and solve human problems. In the future, our day-to-day living, health, and the environment will benefit from applying basic research in biology to technological innovation, as they have in the past. Topics to be explored include efficient architecture, cooperative control, robotics, multimodal sensory integration for controlling behavior, and advanced materials.

Definition of a Course Week

In this course, a Module starts on MONDAY at 12:00 AM Central Time and ends on SUNDAY (+1 week) at 11:59 PM Central Time. Assignments are due by 11:55 PM unless otherwise specified (Quizzes open at 6 AM on Friday and **close at Noon on Monday**).

For more information, see the [University's Academic Calendar](#).

Course Goals and Objectives

Upon completing this course, students will:

- Have a solid understanding of nature as inspiration for innovation.
- Be able to explain the concepts learned to a variety of audiences in a clear and concise manner.
- Be able to apply the tools learned to arrive at sustainable design, engineering, architecture, and/or business solutions.
- Conclude the course with an overview of bioinspired innovation in the form of a course glossary, a series of forum posts, and a final project

Course Structure

This is a 3-credit hour course. The course is 8 weeks long; it consists of 8 content modules. Please be aware that this course is accelerated; 16 weeks' worth of content will be covered in an 8-week time span. You should dedicate approximately 12–16 hours per week to working on the course itself, but actual time commitments will vary depending on your input, needs, and personal study habits. You should be logging into the course every day to keep up with the workload and meet deadlines.

This course is designed with the principles of collaborative learning, constructivism, and active participation in mind. You are encouraged to share your thoughts and engage in problem-solving. The course has a consistent and predictable structure, organized around the modules, with a course website that is straightforward and easy to navigate. Instructions and due dates for activities and assignments are clearly articulated so that you know what is expected of you, and so you will be able to easily stay on track.

We realize that you have a life beyond the scope of this course. However, if you are unable to complete an assignment because of other obligations, you should notify the instructor or, better yet, prepare the assignment ahead of time and post it early. This will give your classmates a head start in reading and responding to your work. Most assignments are due by 11:55 PM CT on their respective due dates as listed with the assignment, giving you and your classmates time to read and comment on other participants' work before the next module begins.

Textbooks

There are no formal textbooks for this course.

Articles

Other reading materials will be listed in the weekly Lesson, Readings, and Resources pages within the course website.

Course Outline

Module Overview Page

Each module will begin with an overview page. This page will explain what the module is about, what learning goals you are expected to achieve, and in what activities you will participate. Each module is designed with the same structure and activities unless otherwise specified. The module activities are explained in greater detail below. You can find the due dates of specific assignments on the assignment's page.

Module 1: Introduction to Bioinspiration and Biomimicry/Creativity and Innovation

Module 2: Biological Materials & Nanostructures

Module 3: Robotics

Module 4: Sensing the Environment

Module 5: Energy and Architecture

Module 6: Maintaining Community

Module 7: Bioinspiration and Human Health

Module 8: The Business of Bioinspiration

Course Activities

You are expected to complete your work independently, in accordance with [University policy](#). Failure to do so will result in strict disciplinary action, including loss of all credit for the assignment, notification of a dean, and possible dismissal from the University. You may work with others on homework, but the final product must be your own.

Lessons, Readings, and Resources

Lessons are designed to give an overview of the topic at hand. The lectures are delivered as Moodle lessons. They will include text, pictures, graphs, video, and audio. The lectures are designed specifically for the online environment. All content will be made accessible to all students.

Lessons may have questions included in them. Please answer the questions since they will help you remember what you have learned, or to apply what you have learned and already know. The answers will be recorded and will inform the instructors of the student's interests and abilities. The next time you open the Lesson (to study for the quiz, for instance) you will notice that the answer blocks to the questions are empty. That is OK, your previous answers were recorded and you can now just skip the question.

No textbook is required. Each module has required readings that will allow you to gain more insight into the topic – beyond the lecture or to support the lecture. Readings will come from the primary literature, secondary literature, or current high-quality science writing on the web (including a bioinspiration blog by researchers at Illinois). Videos, podcasts, and audio recordings will also be included in the modules. They also include interviews with (Illinois) scientists who do cutting-edge research in the field discussed that week.

Discussion Forum

Each week, you will answer discussion questions or complete an assignment. You will post your work to the Discussion Forum. You are expected to contribute constructive feedback to your course-mates' posts and facilitate the discussion in your own thread. A little variety is found in the difference in expectations for the forum assignments from module to module. In fact, sometimes the discussion assignment is not really a discussion on a topic with multiple points of view - it is "just" an assignment - but since we encourage you to share your work and comment on the work of others we put the assignment in a discussion forum.

Bioinspiration Database

Every other week (odd-numbered modules), you will contribute your own background research on a bioinspired product or process to a database. You will pick a topic from a list of choices during those weeks. You are also expected to give constructive feedback to your course-mates' entries during the even-numbered modules.

Assignments

There are several activities in this course that will make up your Assignment grade:

■ Minute Papers

Once per week consider the materials you have reviewed during the module—the lessons, the readings, and any other activities you undertook. You will write a reflective post. What was the most interesting thing you learned in this module? Please mention any problems you might have had understanding any part of the module. How might this information have been presented differently to make it more clear? You should view this as a formative assessment exercise that will also help the instructor determine where your interests lie and improve on the course for the next time the course is offered.

■ Orientation Activities

These activities help us orient ourselves to begin work on this course together. Please be sure to see all activities in the [Orientation](#) tab.

Quizzes

At the end of each module, students will take a self-paced quiz to evaluate new knowledge obtained (from lectures, readings, videos, synchronous discussion, etc.). This will be a mixture of multiple-choice, true/false, matching, and short answer questions. You will get one attempt to take the weekly quiz. Once you start you have 90 minutes to complete the quiz. (You can take the Orientation quiz and the How to Research Scientific Literature quiz multiple times.)

Peer-Reviewed Teaching Tool Project

Here, you are tasked to create a teaching tool on a topic related to bioinspiration. This can be a video or an audio podcast, a cartoon, a "BuzzFeed" post, etc. After you submit a proposal and then the final project, your peers will grade your work and you will grade the work of 5 of your peers. Please read the instructions carefully on the PRTT Project Information pages.

Community Participation

Community participation in an online learning environment is essential to your commitment to engagement with our course. Additionally, in **sharing resources as biologists or engineers interested in bioinspired design**, we can amplify the impact of this topic even outside of the course. Thus, 5% (100 points) of your overall course grade will come from a measure of your participation in our Social Forum and in our Q & A Forum. Ways to attain points in this Community Participation category are listed below:

- 75 points: Social Forum postings and replies. Each post is worth 15 points and each reply is worth 5 points (for a maximum of 75 points total). Ideas for posts include:
 - Current Events/News articles related to bioinspiration
 - Events/Other things related to bioinspiration
 - Link to your social media posts related to bioinspiration
 - Reply to any post with meaningful commentary
- 25 points: Q & A Forum postings and replies. Each post is worth 10 points and each reply is worth 5 points (for a maximum of 25 points total). Ideas for posts include:
 - Any non-personal (i.e. grade-related) questions related to the course
 - Meaningful reply to any question asked

Actually, I hope you will not see this "participation" as another box to check. I want to encourage you to share your findings and thoughts, sometimes beyond just the people in the course.

Course Grading

Grading Distribution:

Category	Grade Weight
Discussion Forum	30%
Bioinspiration Database	20%
Assignments	15%
Quizzes	15%
PRTT Project	15%
Community Participation	5%
Total	100%

Grading Scale

Grade	Percent
A+	97–100
A	92–96.99
A–	90–91.99
B+	87–89.99
B	82–86.99
B–	80–81.99

Grade	Percent
C+	77–79.99
C	72–76.99
C–	70–71.99
D+	67–69.99
D	62–66.99
D–	60–61.99
F–	0–59.99

Getting Help

If you need help:

The instructor is available for virtual office hours by appointment. Please do not hesitate to reach out to set up an appointment to meet in person or virtually. Contact the instructor (see Instructor Information).

- In order to better facilitate our community, please only contact your instructor directly if you have a personal question.
- For all other questions about course content, activities, deadlines, technical problems, etc., please **check the General Q & A forum** to see if someone else has already asked your same question and received a response.
- If your question isn't there yet, **post your question** to the General Q & A forum. Feel free to help your peers out if you know the answer! Your instructor will also respond on this forum as well, so rest assured, we will all help to find answers!
- If you have technical problems with the course, please fill out [this form](#).