IB 411 Bioinspiration - Syllabus Fall 2015

Course Description
This fully online, 8-week course (using a Moodle LMS) 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 using findings in basic research in biology for technological innovation, as it has in the past. Topics to be explored include efficient architecture, cooperative control, robotics, multimodal sensory integration for controlling behavior, and advanced materials.

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 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 are required to log on to the course website a minimum of 4 days per week but as discussions develop, you will probably need to do so more frequently.

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 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 of their respective due dates as listed with the assignment, giving you and your classmates time to read and comment on each other’s work before the next module begins.

**Textbooks**

There are no formal textbooks for this course.

**Articles and e-Reserves**

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

**Course Outline**

Week 1: Introduction to Bioinspiration and Biomimicry. Creativity and Innovation

Week 2: Biological Materials & Nanostructures

Week 3: Robotics

Week 4: Sensing the Environment

Week 5: Energy and Architecture

Week 6: Maintaining Community

Week 7: Bioinspiration and Human Health

Week 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.

**The Module’s 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.

**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 primary literature, secondary literature, or current high-quality science writing on the web (including bioinspiration blog by the instructor). Videos, podcast, audio recordings will also be included into the modules. They are include interviews with (Illinois) scientists who do cutting-edge research in the field discussed that week.

**Forum Assignments**

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-mate’s posts and facilitate the discussion in your own thread. I tried to create a little bit of variety by changing the expectations for the “Discussions/Forums a little bit 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.

**Glossary of Bioinspiration**

Each week, you will contribute your own background research on a bioinspired product or process. You will be assigned a topic each week. You are also expected to give constructive feedback to your course-mate’s entries. Also, update your glossary entry based on other people’s suggestions.

**Quizzes**

At the end of each module, students will take a self-paced quiz to evaluate new knowledge obtained (from lecture, 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.)
Reflections

Once per week consider the materials you have reviewed during the module—the lessons, the readings, and any other activities you undertook. 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.

Butterfly by Rooha Nasir (UIUC)

Weekly Live Sessions

The instructor will be available for virtual office hours: Monday at 10 AM and Wednesday at 2 PM (CST), or by appointment. I am more than happy to occasionally "meet" during evening hours but please make an appointment ahead of time (contact me at vanlaarh@life.illinois.edu).

To enter the Virtual Office click the link at the top left of the course home page titled "Virtual Office". If it is your first time using Blackboard Collaborate (which powers the Virtual Office) please make sure to take an extra 10 minutes to log on and set up your computer.

Peer-reviewed Teaching Tool Project

Basically, 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 submitted a proposal and then the final project your peers will grade your work, and you will grade the work of 4 of your peers. Please read instructions carefully about how to upload you work.

A note about sources of information: It is highly recommend that you only consult the following sources of information in studying for this class. Use of another source (such as
Internet sites found via Google may provide information that is unreliable.

- Suggested books and required readings
- Supplemental information posted on course website
- Internet links provided in class or on course website

## Course Grading Scale

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## Instructor Information

Marianne Alleyne, Ph.D.
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University of Illinois at Urbana-Champaign

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Twitter: Cotesia1 (#IB411, #bioinspiration, #biomimicry)

Virtual Office Hours: Monday 10AM, Wednesday 2PM, or by appointment

Office Phone: 217-333-8652

## About Me

I am a research scientist in the Department of Entomology. Yep, I am a “bug-doctor”. My main research is on the physiological effects of parasitism on insect hosts. I teach Insect Physiology at
the University of Illinois. Lately I have been developing different teaching modules on “Biological Inspiration” because insects can inspire many other fields of research and spark innovation.

I was born and raised in the Netherlands and moved to the U.S. for college. I received my Bachelors in Integrative Biology from the University of California at Berkeley and my Masters in Entomology from the University of California at Riverside. I have lived in Champaign-Urbana since 1995 where I received a Ph.D. in Entomology from the University of Illinois in 2000. Since then I has been a Research Scientist in the Department of Entomology.

I am happily married to a Mechanical Engineer (@ILAlleyne) and we have two sons. I love sports, in particular college basketball and European soccer. I also love to travel.

**Getting Help**

If you need help:

- 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! In this way we hope to build a supporting learning environment.
- If you have technical problems, please fill out this form.