

**ENTR 360/ENVT 352/BIOL 453**  
**Special Topics: Biomimicry Thinking**  
**Course Syllabus**

MWF 11 AM RITA 103

**Instructor Deb Bidwell**

RITA 229 [bidwelld@cofc.edu](mailto:bidwelld@cofc.edu) 843-953-7107

**Spring 2019**

## **Course Description:**

Biomimicry is an emerging approach to sustainability that looks to nature for innovative solutions to human problems. Biomimicry is interdisciplinary and entrepreneurial. Its foundation lies within biology, but merges with engineering and design. The adaptations and deep patterns present within the millions of species living on earth today represent billions of years' worth of time tested, sustainable solutions to the same challenges that humans now face. Humans are learning to apply these functional biology design lessons through the process of biomimicry. Practitioners of biomimicry don't just learn about nature, they learn from nature. Biomimicry aims to realign human populations with nature's principles, to promote a viable, equitable, and livable world that creates conditions conducive to life.

### *Pre-requisites*

- Junior Standing.

## **Instructional Learning Outcomes:**

### **By the completion of this course, a student will be able to...**

- Demonstrate Grinnell style (i-sites) natural history field notes to sketch and discuss functional biology strategies and adaptations.
- Describe and interpret life's fundamental biological principles.
- Analyze and apply pivotal readings in environmental history to evaluate the human-nature connection, environmentalism, and the biophilia hypothesis.
- Compare and contrast biomimicry with other "green" disciplines
- Identify, describe, and apply the three essential elements of biomimicry
- Translate biological mechanisms at the form, process, and systems level from the primary scientific literature into abstracted design principles that can be communicated to and utilized by entrepreneurs, engineers, and designers.
- Apply biomimicry thinking to scope, research, design, create, prototype, and evaluate solutions to human design challenges utilizing the "biology to design" and the "challenge to biology" frameworks of biomimicry thinking.

- Practice biomimicry based creative brainstorming, including design charrettes.
- Communicate biomimicry strategies and solutions to scientific and non-scientific audiences through written, oral, and poster presentations.
- Evaluate “green” businesses using Life’s Principles Analysis, and recommend improvements based on biomimicry theory.
- Utilize systems thinking to formulate and assess biomimicry’s role as a leverage point within the larger discipline of sustainability studies.

## Contact/Communication

### *Private Student-To-Instructor Contact*

- Students should contact me about issues that are specific to the student by **email at [bidwelld@cofc.edu](mailto:bidwelld@cofc.edu)**
- My response turn-around time with emails will normally be **within 24 hours on weekdays and within 48 hours on weekends.**

### *General Student-To-Instructor and Student-To-Student Contact*

- Students should contact the Instructor and other students on issues that are not student-specific and may benefit or apply to the entire class using the OAKS **Discussion “Hallway Conversations” open 24 hours a day, 7 days a week.**
- My response turnaround time on the discussion “hallway conversations” will normally be **within 24 hours weekdays and within 48 hours on weekends.**

### *Office Hours*

- In person office hours (group drop-in) **RITA 229 Mondays and Wednesdays 2:30 - 4:30 PM and by appointment**
- Individual appointments may be **arranged by email.**

### *Course Communication and Community Building*

- **OAKS** will be utilized for **content, news, updates, and online office hours.**  
*New to Oaks?* tutorials here: <http://blogs.cofc.edu/oaks/students/getting-started/>
- **Email and/or News updates on OAKS** will be used to communicate important or sudden changes in course information.
- We will **all work together to build our classroom and online learning community.** I will play a facilitating role in helping you get to know, work with, trust and collaborate with the diverse members of our class. Each member of the class must be willing to participate in a dynamic and engaging learning group that is inclusive. Your participation, willingness to contribute, and your initiative are paramount to having a successful and enjoyable learning experience. We **aim to develop a spirit of camaraderie and team learning that will unite us.**
- This semester we will be doing some group discussion work online using discussion boards through OAKS. You can find a rubric about the expectations for quantity and quality of online discussion comments on OAKS.

- **Netiquette:** In our written course discussions, we will be using complete sentences and proper grammar and will **not be using abbreviations or slang the way we might while texting.** Because it is difficult to interpret tone from written text, and our online communication in the OAKS discussion boards will lack facial expression, body language, hand gestures, and other social clues, it is especially important that we take care to be sensitive to possible misinterpretation and hurt feelings that result in exclusion rather than inclusion. **We will all need to make sure that we are respectful, and professional in our posts.** For example, when we are challenging each other's ideas, it is vital that we do not allow arguments to become personal. We can disagree about the subject matter in a respectful, intellectual way that still allows for us to work well, and collaborate together.

## Expectations

- Students must earn **100% on OAKS syllabus quiz** to access course materials.
- Students should plan to **log into Oaks at least 3 times per week.**
- Students should dedicate **6+ hours per week** outside of class to be successful.
- This class is **student-driven.** Motivation must come from the student.
- Our class should be **interactive and engaging.**
- Students are expected to **contribute** to our **learning community.**
- **There are weekly obligations**
- **Paired and group work is expected.**
- **Ask for help early and often.** Don't wait until you feel overwhelmed.

## Required Course Materials

- **Computer/tablet/technology** with access to **internet**
- **Software/Apps:** (OAKS, Microsoft 365, google drive, digital camera, scanning application)
- **Field note supplies** (see OAKS for detailed list of inexpensive supplies)

## Attendance and Participation

- Student participation includes group work in and out of class, and written discussion posts to the online group discussion board. Please see netiquette rules above and rubric regarding posting guidelines and expectations.
- Missing more than five regular class sessions with unexcused absences will result in a proportional overall grade reduction beginning at 5%.
- Repeated tardiness more than four times to regular class sessions will result in a proportional grade reduction beginning at 2.5%.
- **Missing more than 7 classes results in a WA (withdrawn for absences)**

## Accommodation

**Center for Disability Services** (<http://disabilityservices.cofc.edu/for-faculty/faqs.php>)

- Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged. This College abides by section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. If you have a documented disability that may have some impact on your work in this class and for which you may require accommodations, please see an administrator at the Center of Disability Services/SNAP, 843.953.1431 so that such accommodation may be arranged.
- Athletes, International, ESL, those serving in the military, and all students with life circumstances that may warrant accommodations are encouraged to **discuss any concerns with the Instructor** in a timely manner. I am fluent in Spanish. I understand that we all have way more important things going on in our lives than this class. I aim to be friendly, approachable, understanding, and I will hold you to high standards.

## Honor Code and Academic Integrity:

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved. Incidents where the instructor determines the student's actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the XX to be expunged. The F is permanent. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

<http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>

**Center for Student Learning:** I encourage you to utilize the Center for Student Learning's (CSL) academic support services for assistance in study strategies, speaking & writing strategies, and course content. They offer tutoring, Supplemental Instruction, study strategy appointments, and workshops. Students of all abilities have become more

successful using these programs throughout their academic career and the services are available to you at no additional cost. For more information regarding these services please visit the CSL website at <http://csl.cofc.edu/> or call (843) 953-5635.

## Assessment

- Field naturalist notes (4) will be utilized to tie class room lecture material, assigned readings, human design, and nature observations together. Peer sharing/feedback/brainstorming is required.
- Written discussion posts (4) will be made through the OAKS discussion board in small groups, critiquing articles/videos, utilizing supporting references, providing peer feedback, and stimulating analysis/debate/discussion. (*See curriculum map for details*)
- Rigorous multi-week student projects to research, practice, and communicate biomimicry include extensive written, oral, and visual components. (*See curriculum map for details*)

### Grades calculated as follows:

<u>Component</u>	<u>Value (% of final course grade)</u>
<b>Class Participation/Preparedness</b>	<b>10</b>
<b>Nature Journal field notes and brainstorming (4)</b>	<b>20</b>
<b>Biomimicry Thinking Project (1)</b>	<b>30</b>
<b>Communicating BMY Projects (2)</b>	<b>20</b>
<b>Written Discussions (4)</b>	<b>20</b>
<b>Total:</b>	<b>100%</b>

### Grading scale:

<b>Grade Equivalent:</b>	<b>Percentage Range:</b>
A	93 and above
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	Less than 60

Tentative Schedule \*this schedule may be modified as the course progresses.

Week	Lecture topic	Readings/excerpts/videos	Due for grading
1/9-11	Introduction. What is biomimicry? What is nature?	Benyus' Primer on biomimicry, Kahn and Kellert's Children and Nature	Must score 100% on <b>syllabus quiz</b> (OAKS online) for access to course materials on OAKS.
1/14-18	(Re)connect-human nature connection	Louv's Last Child in the Woods, McKibben's The End of Nature, Cronon's The Trouble with Wilderness, Wilson's Biophilia, Bregman et al 2015 PNAS Nature experience	<b>Nature Journal #1</b> upload by Sunday 1/13, BMY brainstorm in class Monday 1/14
<b>No class on Monday, Dr. MLK Jr. Day 1/23-25</b>	Ethos – wanting to live sustainably	Leopold's Land Ethic & Green Fire, Carson's Silent Spring, Owen's Conundrum, History of a cup of coffee. Video: Story of Stuff.	<b>Discussion Board Post#1:</b> Trouble with wilderness. Post thread to OAKS by W & <b>reply to 2 peer posts</b> by F
1/28-2/1	Emulate - Nature as mentor and measure.	Videos: Shinkansen bullet train, Mick Pearce, Michael Pawlyn, Beer and Biodiversity.	<b>Nature journal #2</b> upload by Sunday 1/27, BMY brainstorm in class Monday 1/28 <b>Discussion Board Post #2</b> – Conundrum. Post thread to OAKS by W & <b>reply to 2 peer posts</b> by F
2/4-8	Life's Principles, functional biology	Darwin's On the Origin of Species, Class handouts from Biomimicry 3.8, Videos: BBC How Nature Works	<b>Nature journal #3</b> upload by Sunday 2/3, BMY brainstorm in class Monday 2/4
2/11-15	Life's Principles continued. Challenges defined, groups assigned.	Class handouts from Biomimicry 3.8.	<b>Discussion Board Post #3</b> Life's Principles analysis of a "green" company. Post thread to OAKS by W & <b>reply to 2 peer posts</b> by F.  <b>Nature journal #4</b> upload by Sunday 2/10, BMY brainstorm in class Monday 2/11
2/18-22	Biomimicry Thinking – Scoping. Function and Context	Ideo's Five Whys and How might we? Videos PBS Deep Look	<b>Team agreement due</b> <b>Team scoping brief due</b>
2/25-3/1	Biomimicry Thinking - Discovering	AskNature resources, Primary literature	No nature journal due this week – dig into research.
3/4-8	Biomimicry Thinking – Discovery continued	Primary literature	<b>15 mentors each</b> due F 3/8 by 11:59 PM.
3/11-15	Biomimicry Thinking – Discovery continued	Primary literature	Hone to 3 mentors each, work on NTS's
3/18-22 <b>spring break</b>	<b>spring break</b>	<b>spring break</b>	Optional extra credit nature journal.

3/25-29	Biomimicry Thinking – Creating, brainstorming	Class handouts from Biomimicry 3.8 Video, Ideo brainstorming.	<b>Three Nature’s Technology Summaries each</b> due F (Major research continues)
4/1-5	Biomimicry Thinking – Creating & prototyping	Ideation supplies	Create <b>draft of “what if” electronic poster</b> from your favorite NTS
4/8-12	Biomimicry Thinking - evaluating	Life’s Principles Checklist	<b>Student Oral Presentations</b> Peer evaluations. Self-evaluations
4/15-19	Human behavior	Bregman’s The easiest way to change people’s minds, Jia’s Understanding the human mind, Manning’s Psych of human behavior. Videos: Nature is Speaking, Why facts don’t change minds	<b>Student Oral Presentations cont...</b> Peer evaluations. Self-evaluations  <b>Discussion Board Post # 4</b> – everybody wants to change the world but nobody wants to change. Post thread to OAKS by W & <b>reply to 2 peer posts</b> by F
16 <b>Last day of class is T 4/23</b>	Sustainability, Systems thinking	Meadow’s Leverage Points, Videos: Story of Solutions, Forget Shorter Showers	<b>“What if?” final draft of electronic poster due. Course evaluations</b>
			<b>Final “elevator speech” spreading the meme projects due at or before final exam period, Friday 4/26 at 11 AM in OAKS dropbox</b>