

GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:

Copy and paste **current** course information from [Class Search/Course Catalog](#).

College/School	College of Global Futures	Department/School	School of Complex & Adaptive Systems
Prefix: <u> BMY </u>	Number: <u> 230/294 </u>	Title: <u> How Nature Works Lecture (230) & Lab (294) </u>	Units: <u> 3/1 </u>

Course description:

Is this a cross-listed course? Yes If yes, please identify course(s): BIO 230

Is this a shared course? No If so, list all academic units offering this course:

*Note- For courses that are crosslisted and/or shared, a letter of support from the chair/director of **each** department that offers the course is required for **each** designation requested. By submitting this letter of support, the chair/director agrees to ensure that all faculty teaching the course are aware of the General Studies designation(s) and will teach the course in a manner that meets the criteria for each approved designation.*

Is this a **permanent-numbered** course with topics? Lecture- yes; Lab component has not yet been approved for perm #

If **yes**, each topic requires **an individual submission**, separate from other topics.

Requested designation: SG

Mandatory Review: (Choose one)

*Note- a **separate** proposal is required for each designation.*

Eligibility: Permanent numbered courses **must** have completed the university’s review and approval process. For the rules governing approval of omnibus courses, contact Phyllis.Lucie@asu.edu.

Submission deadlines dates are as follow:

For Fall 2021 Effective Date: October 2, 2020

For Spring 2022 Effective Date: March 5, 2021

Area proposed course will serve:

A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study. It is the responsibility of the chair/director to ensure that all faculty teaching the course are aware of the General Studies designation(s) and adhere to the above guidelines.

Checklists for general studies designations:

Complete and attach the appropriate checklist

- [Literacy and Critical Inquiry core courses \(L\)](#)
- [Mathematics core courses \(MA\)](#)
- [Computer/statistics/quantitative applications core courses \(CS\)](#)
- [Humanities, Arts and Design core courses \(HU\)](#)
- [Social-Behavioral Sciences core courses \(SB\)](#)
- [Natural Sciences core courses \(SQ/SG\)](#)
- [Cultural Diversity in the United States courses \(C\)](#)
- [Global Awareness courses \(G\)](#)
- [Historical Awareness courses \(H\)](#)

A complete proposal should include:

- Signed course proposal cover form
- [Criteria checklist](#) for General Studies designation being requested
- Course catalog description
- Sample syllabus for the course
- Copy of table of contents from the textbook and list of required readings/books

Proposals must be submitted electronically with all files compiled into one PDF.

Contact information:

Name Charlene Becher E-mail Charlene.stapleton@asu.edu Phone 480-965-2337

Department Chair/Director approval: (Required)

Chair/Director name (Typed): Manfred D. Laubichler Date: 11/9/2020

Chair/Director (Signature): _____

GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:

Copy and paste current course information from [Class Search/Course Catalog](#).

College/School	College of Global Futures	Department/School	School of Complex & Adaptive Systems
Prefix:	BM	Title:	How Nature Works Lecture (230) & Lab (294)
Number:	230/294	Units:	<u>1</u>

Course description:

Is this a cross-listed course? Yes If yes, please identify course(s): BIO 230

Is this a shared course? No If so, list all academic units offering this course:

Note- For courses that are crosslisted and/or shared, a letter of support from the chair/director of each department that offers the course is required for each designation requested. By submitting this letter of support, the chair/director agrees to ensure that all faculty teaching the course are aware of the General Studies designation(s) and will teach the course in a manner that meets the criteria for each approved designation.

Is this a **permanent-numbered** course with topics? Lecture- yes; Lab component has not yet been approved for perm #

If **yes**, each topic requires **an individual submission**, separate from other topics.

Requested designation: SG

Mandatory Review: (Choose one)

Note- a separate proposal is required for each designation.

Eligibility: Permanent numbered courses **must** have completed the university's review and approval process. For the rules governing approval of omnibus courses, contact Phyllis.Lucie@asu.edu.

Submission deadlines dates are as follow:

For Fall 2021 Effective Date: **October 2, 2020**

For Spring 2022 Effective Date: **March 5, 2021**

Area proposed course will serve:

A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study. It is the responsibility of the chair/director to ensure that all faculty teaching the course are aware of the General Studies designation(s) and adhere to the above guidelines.

Checklists for general studies designations:

Complete and attach the appropriate checklist

- [Literacy and Critical Inquiry core courses \(L\)](#)
- [Mathematics core courses \(MA\)](#)
- [Computer/statistics/quantitative applications core courses \(CS\)](#)
- [Humanities, Arts and Design core courses \(HU\)](#)
- [Social-Behavioral Sciences core courses \(SB\)](#)
- [Natural Sciences core courses \(SQ/SG\)](#)
- [Cultural Diversity in the United States courses \(C\)](#)
- [Global Awareness courses \(G\)](#)
- [Historical Awareness courses \(H\)](#)

A complete proposal should include:

- Signed course proposal cover form
- [Criteria checklist](#) for General Studies designation being requested
- Course catalog description
- Sample syllabus for the course
- Copy of table of contents from the textbook and list of required readings/books

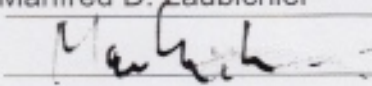
Proposals must be submitted electronically with all files compiled into one PDF.

Contact information:

Name Charlene Becher E-mail Charlene.stapleton@asu.edu Phone 480-965-2337

Department Chair/Director approval: (Required)

Chair/Director name (Typed): Manfred D. Laubichler Date: 11/9/2020

Chair/Director (Signature): 

Arizona State University Criteria Checklist for

NATURAL SCIENCES [SQ/SG]

Rationale and Objectives

Public scientific literacy, critical for sound decisions on scientifically infused issues such as climate change, includes understanding of basic science concepts, such as the fundamental behavior of matter and energy. It also includes the understanding that “science” is not an encyclopedic collection of facts. Rather, it is a process of exploration that embraces curiosity, inquiry, testing, and communication, to reduce uncertainty about nature. Absent understanding of scientific concepts and of the nature of science, science and pseudoscience are difficult to distinguish, and normal scientific disagreements may be misinterpreted as ideological or political disputes. The goal of the natural sciences (SQ/SG) requirement, including the laboratory requirement, is to instill understanding of basic science content and of the nature of science in every ASU graduate.

10/1989

REV: 1/1991, 3/1991, 1/2000, 10/2008, 4/2014

Proposer: Please complete the following section and attach appropriate documentation.

ASU--[SG] CRITERIA			
I. - FOR ALL GENERAL [SG] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:			
YES	NO		Identify Documentation Submitted
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. Course emphasizes the mastery of basic scientific principles and concepts.	BM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. Addresses knowledge of scientific method.	BM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. Includes coverage of the methods of scientific inquiry that characterize the particular discipline.	uBM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. Addresses potential for uncertainty in scientific inquiry.	BM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. Illustrates the usefulness of mathematics in scientific description and reasoning.	BM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.	BM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. Students submit written reports of laboratory experiments for constructive evaluation by the instructor.	BM Y230 Syllabus
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.	BM Y230 Syllabus
II. - AT LEAST ONE OF THE ADDITIONAL CRITERIA THAT MUST BE MET WITHIN THE CONTEXT OF THE COURSE:			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A. Stresses understanding of the nature of basic scientific issues.	BM Y230 Syllabus
<input type="checkbox"/>	<input type="checkbox"/>	B. Develops appreciation of the scope and reality of limitations in scientific capabilities.	
<input type="checkbox"/>	<input type="checkbox"/>	C. Discusses costs (time, human, financial) and risks of scientific inquiry.	

[SG] REQUIREMENTS CANNOT BE MET BY COURSES:		
	<ul style="list-style-type: none">• Presenting a qualitative survey of a discipline.	
	<ul style="list-style-type: none">• Focusing on the impact of science on social, economic or environmental issues.	
	<ul style="list-style-type: none">• Focusing on a specific or limiting but in-depth theme suitable for upper-division majors.	

Course Prefix	Number	Title	General Studies Designation
BMY/BIO	230	How Nature Works	SG

Explain in detail which student activities correspond to the **specific** designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checklist)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
I. 1	BMY230 How Nature Works will focus on explaining and exploring the scientific method in modules throughout the course schedule.	In Modules 1-5, students are exposed to the process of scientific inquiry through assignments such as "Exploring the Scientific Method", and the "Biomimicry Case Study" (see syllabus).
I. 2	BMY230 How Nature Works will focus on explaining and exploring the scientific method in Modules 1 and 2.	Throughout Modules 1 and 2, students will be exposed to each step of the scientific method and use this understanding to complete assignments and any associated lab work (if taking BMY231). Module 2 assignment titled "Exploring the Scientific Method" (see syllabus) will introduce students to the process of scientific inquiry, research methodology, and addresses potential for uncertainty. Students will use scientific database to find one article, identify each section (question, hypothesis, prediction, method, results, conclusion), and submit a wrap-up description explaining each step of the scientific method.
I. 3	BMY230 How Nature Works will focus on explaining and exploring the scientific method in Modules 1 and 2.	For assignments "Exploring the Scientific Method" and "Biomimicry Case Study" (see syllabus) students will conduct required research on the scientific method of specific biomimicry-related case studies.
CHECKLIST CONTINUED ON NEXT PAGE	CHECKLIST CONTINUED ON NEXT PAGE	CHECKLIST CONTINUED ON NEXT PAGE

BM230: How Nature Works

Class Number:

Credit Hours: 3

Semester & Year (Start Date – End Date): Spring 2020

Course Day, Time, Location (on ground only): Biomimicry Center, College of Design South (CDS) 126

Pre-requisite: N/A

Co-requisite: N/A

Instructor

Name: Zachary Shaffer

Email: Zachary.shaffer@asu.edu

Phone:

Office:

Office Hours:

Teaching Assistant (TA)

Name: Lily Urmann

Email: lurmann@asu.edu

Phone:

Office:

Office Hours:

Syllabus Disclaimer

All syllabi are subject to minor changes to meet the needs of the instructor, school, or class. Every effort will be made to avoid changing the course schedule, but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes. Please check your ASU email and the Announcements on the course site often.

Course Description

How Nature Works teaches biology through the lens of function, thereby providing a core understanding in biology for all students, no matter their background. This course will explore the process of scientific discovery and how biological knowledge can inform other disciplines. Each week, we will investigate a new topic regarding how ecosystems and organisms’ function—e.g., *How do ecosystems cycle nutrients? How do animals move through air, water, and on land? How do organisms defend themselves against disease?* By the end of this course, students will have learned core concepts in biology as well as how these concepts apply to other disciplines.

This course will include an optional weekly field lab for students who wish the course to qualify for General Students (SG) Natural Sciences (BM231). This lab will be a hands-on session that exposes students to scientific phenomena and methodology in the biomimicry discipline, to enhance the learning of course material.

Learning Outcomes

At the completion of this course, students will be able to:

- Understand the scientific method and application in biology
- Understand key biological concepts and theories, including evolution and biomimicry
- Apply scientific reasoning skills and biological knowledge to applications in design, engineering, and decision-making relevant to your life and to the society and world in which you live.

Course Delivery and Access

Students in this course will meet regularly in the classroom on scheduled days/times. Course content will be delivered through lectures, textbooks, class discussion, and collaborative projects. A textbook is required for this course (see below). Additionally, some course content and assignments will be accessed online in Canvas, which can be accessed by my.asu.edu.

Course Textbook and Materials

Exploring the Way Life Works: The Science of Biology. 2001. Mahlon Hoagland, Bert Dodson, and Judy Hauck. Crown. 233 pp.

Biomimicry Resource Handbook: A Seed Bank of Best Practices. 2013. Biomimicry 3.8. (available digitally through the course).

Supplemental Readings

Other supplemental reading to be provided by the instructor.

Grading Scale

This course will be graded on an A-E scale using a +/- option:

Grade	Percentage	Points Range
A+	97%–100%	150-155
A	93%-96.9%	144-149
A-	90%-92.9%	140-143
B+	87%-89.9%	135-139
B	83%-86.9%	129-134
B-	80%-82.9%	124-128
C+	77%-79.9%	119-123
C	70%-76.9%	113-118
D	65%-69.9%	100-112
E	Below 65%	0-99

In class participation (Worksheets, clicker questions, etc.)	10%
Reading assignment quiz questions	10%
Written Research Assignments	20%
Field Session (attendance and related assignments)	20%
Exams	40%
TOTAL	100%

Communicating with the Instructor

It is important to be prepared for class. Readings relevant to each lecture are posted in the lecture schedule (found on Canvas). Homework assignments posted on Canvas will also help prepare you for the lectures.

The most beneficial kind of interaction with instructors is by visiting during office hours. If you cannot make the office hours, email the instructors and can arrange an appointment.

Submitting Assignments

All time frames used in class follow Arizona Mountain Standard Time (MST). Arizona does not observe daylight saving time (DST) from March through November; therefore, the time in Arizona will not align with other places that are on MST for half the year.

Attendance and Absences

Please follow the appropriate university policies to request absences or accommodations related to [ACD 304-04 Accommodation for Religious Practices](#) and [ACD 304-02 Missed Classes Due to University-Sanctioned Activities](#).

Showing evidence of being prepared for discussions in class, contributing insightful comments, and commitment to class activities will all reflect high course participation that enables others to learn from and with you. You are also expected to make site visits or venture off campus (e.g. to your project partners organization or area) and complete a defined amount of fieldwork as determined by your project plan. Semesters go by quickly. Keeping on task is thus vital for achieving success in this course.

Attendance is required for all sessions, including those scheduled for working in the classroom with the instructor. If you must be absent from a class due to illness or unexpected circumstances, email the instructors to request an excused absence as much prior to class as possible. More than two unexcused absences will result in a grade reduction. Please contact your instructor if you are facing difficulties with attending the course or completing the required course assignments.

Using your phone, computer, or other devices for non-class related purposes during class time or meetings is disrespectful and disruptive to instructors and your classmates. Your attention and active participation is especially valuable in problem and project-based learning, because it is the key to self-directing learning and collaboratively shaping projects, which cannot happen when you are texting or surfing the web.

Late or Missed Assignments Policy

Notify the instructor BEFORE an assignment is due if an urgent situation arises and the assignment will not be submitted on time. Published assignment due dates (Arizona time) are firm. Late assignments are automatically deducted 25% of points unless specific exceptions have been made with your instructor. Please follow the appropriate University policies to request an accommodation for religious practices or to accommodate a missed assignment due to University-sanctioned activities.

Course Schedule *(subject to change: see syllabus disclaimer)*

Module	Topics	Assignments Due
1	Introduction to Biology – types of biological research, applied vs. basic research, what does a biologist do?	
2	Scientific inquiry – introduction to the scientific method, research methodology, good vs. bad study design	Exploring the Scientific Method
3	Natural design process – evolution, genetic inheritance, mutation	
4	Human design process – parallels and differences with evolution, introduction to biomimicry	Biomimicry Case Study
5	Biological classifications – domains of life, biological names, ecosystems, and biomes	Exam 1
6	Abiotic challenges – temperature, water, nutrients	Exploring Abiotic Pressures
7	Biotic challenges – predation, competition, disease	
8	Humans as drivers of change – climate change, urbanization, invasive species	
9	Cooperation – evolution of sociality, mutualisms and symbioses	
10	Animal navigation and migration – long distance migration, central place foraging	Exam 2
11	Animal communication – senses, color, sound	
12	Animal communication – chemical communication, pheromones, and swarm behavior	
13	Biomechanics – movement through air, water, and on land	Compare/Contrast Design and Nature
14	Biomechanics – adhesion and attachment	
15	Emerging topics in biomimicry and bio-inspired design	Exam 3

Written Research Assignment Descriptions:

- **Exploring the Scientific Method: (5%)** search recent news and/or scientific databases (Google Scholar, Web of Science, etc) for a topic that interests you in science. Read the article and go through and highlight each step of the scientific method: question, hypothesis, prediction, method, results, conclusion. Not all steps may be spelled out exactly, so use your knowledge of the study to fill in each step based on your judgement. Submit a write-up that includes a short description of the study and 1-3 sentences explaining the study as it relates to each step of the scientific method.
- **Biomimicry Case Study (5%):** Choose a biomimicry case study that intrigues you. By 'case study' I mean the human design and the organism or system that inspired it (example: velcro and cocklebur, dyesol solar cells and process of photosynthesis, Kahlenburg/industrial symbiosis and upcycling/decomposition in ecosystems). Think about the biological organism (and form, process, &/or system, etc.) that inspired the innovation. What biotic and/or abiotic challenges led to the organism's strategies that were mimicked? How important are these abiotic and biotic selection pressures to the strategies? Write up a short (no more than 1-2 paragraphs, 200 wds MAX.) description of the human design, the biological strategies that were mimicked, how the challenges/context (abiotic and biotic) led to these strategies, and how important you think the selection pressures were in driving innovation within this organism.
- **Exploring Abiotic Pressures (5%):** Your assignment: Choose 3 abiotic selection pressures and find strategies on AskNature that organisms use to live within these conditions. For each, report out on:
 - What is the abiotic selection pressure?
 - Function
 - What taxonomy path did you take to find an interesting strategy (try navigating in different ways)
 - Organism (common and scientific name). Appropriate format for this always: "Common Name (Genus species)", i.e. first letter of genus capitalized, species not in caps, both italicized and in parentheses.
 - Strategy that is most interesting to you.
- **Compare/Contrast Design and Nature (5%):** Choose one human-designed technology for moving through air, water, or over land. Then choose one organism that moves through a similar medium. Compare and contrast the features that make each successful. Include an illustration or image of each chosen mechanism/organism that points out key features or adaptations that allow movement. Finally, include a paragraph what could still be learned from the organism for further development.

Field Session (BMY231)

This course will include a weekly field session that provides hands-on exposure to scientific phenomena and methodology in the biomimicry discipline in order to enhance the learning of course material. Students will be expected to attend both lectures and field sessions, and complete the related assignments such as written reports of field work to be reviewed and evaluated by the course instructor. Field sessions topics include natural observation and scientific recording exercises, understanding signals and responses in nature, social insect behavior field trips to labs on Tempe campus, and biomimicry/biomechanics exploration. These labs will have a focus on the broader introduction to biology from a functional perspective and students will gain a lower-division level understanding of the material. The field session will explore the course topics further through pre-lab research, in-lab projects and assignments, and post-lab reflections. By the end of this course, students will have learned core concepts in biology as well as how these concepts apply to other disciplines.

Course Evaluations

Students are expected to complete the course evaluation. Feedback provides valuable information to the instructor and the college and is used to improve student learning. Students are notified when the online evaluation form is available and students can access it through myASU as well. See [Student FAQs](#) for more information.

Use of Personal Electronics During Class

Please turn off or silence cell phones, etc., prior to coming to the face-to-face class sessions, and do not send text messages during class time. If you have an emergency and need to keep in communication with someone, please inform your instructor ahead of time. You may use your laptop to take notes. Do not use class time for emails, chats, web browsing, or other non-class related activities.

How Long Students Should Wait for an Absent Instructor

In the event the instructor fails to indicate a time obligation, the time obligation will be 15 minutes for class sessions lasting 90 minutes or less, and 30 minutes for class sessions lasting more than 90 minutes. Students may be directed to wait longer by someone from the academic unit if they know the instructor will arrive shortly.

Students with Disabilities

ASU's Disability Resource Center (DRC) is the entity that provides services to students with disabilities. If you desire accommodation for this course, [contact the DRC](#) to establish your eligibility and make sure they can provide you with the services you will need for this course. Students with disabilities must meet the same standards, deadlines, etc. as any other student in the course.

Student Code of Conduct and Academic Integrity

Students have the responsibility to understand and follow ASU's [Student Code of Conduct](#) and [Academic Integrity Policy](#). You may face ethical decisions during your time as a student. If you're not sure whether or not something is permitted, it is your responsibility to ask questions or find out by doing more research using the links above. Any violations in this course are subject to sanctions and will be reported to the School of Sustainability and the college or school of your major.

The Office of Student Rights and Responsibilities accepts [incident reports](#) from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct.

Academic Integrity (also known as cheating, copying others' work, or even reusing your own work) falls under the Student Code of Conduct. Possible sanctions for violations include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), suspension, and expulsion.

Beware that some websites promote themselves as tutoring and educational resource sites, but may actually be sites that put you at risk for an academic integrity violation if you are using the services to submit work that is not your own or gain knowledge of what to expect on a quiz or exam.

Important: Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on grounds of suspected copyright infringement.

Disruptive Student Behavior

Students are entitled to receive instruction free from interference by other members of the class. An instructor may withdraw a student from the course when the student's behavior disrupts the educational process per the [SSM 201-10 Instructor Withdrawal of a Student for Disruptive Classroom Behavior](#) and [SSM 104-02 Handling Disruptive, Threatening, or Violent Individuals on Campus](#) policies.

Appropriate online behavior (also known as *netiquette*) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts may be deleted by the instructor.

Prohibition of Commercial Note Taking Services

Course content, including lectures, are copyrighted materials. Students may not share outside the class, upload, sell, or distribute course content or notes taken during the conduct of the course (see [ACD 304-06 Commercial Note Taking Services](#) for more information).

Discrimination, Harassment, and Retaliation

[ACD-401 Prohibition against Discrimination, Harassment, and Retaliation](#), prohibits discrimination, harassment or retaliation on the basis of race, sex, gender identity, age, religion, national origin, disability, sexual orientation, and veteran status. Violations of this policy may result in disciplinary action, including termination of employees or expulsion of students. Contact the Office of Student Rights and Responsibilities at (480) 965-6547, if you feel another student is harassing you based on any of the factors above; contact the Office of Equity and Inclusion at (480) 965-5057 if you feel an ASU employee is harassing you based on any of the factors above.

ASU continues to implement U.S. Department of Education guidance regarding sexual assaults under Title IX federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources on ASU's [Sexual Violence Awareness](#) page.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. [ASU Counseling Services](#) are available if you wish discuss any concerns confidentially and privately.

Add/Drop/Withdrawals Deadline

ASU's [Academic Calendar](#) contains important dates by which you can add or drop this course without penalty called

“Last Day to Drop/Add Without College Approval”. After this date, if you choose to withdraw from the course, you may do so by the “Course Withdrawal Deadline”, but will receive a ‘W’ on your official transcript. Consult with your advisor and notify your instructor if you have questions about [Drop/Add and Withdrawal](#).

Grade Appeals

Grade disputes must first be addressed by discussing the situation with the instructor. If the dispute is not resolved with the instructor, the student may appeal to the School of Sustainability per the [University Policy for Student Appeal Procedures on Grades](#). See additional instructions for [undergraduate SOS courses](#) and [graduate SOS courses](#) (under Grade Appeal).

Computer Requirements

This course requires a computer with Internet access and the following:

- Web browsers ([Chrome](#), [Internet Explorer](#), [Mozilla Firefox](#), or [Safari](#))
- [Adobe Acrobat Reader](#) (free)
- [Adobe Flash Player](#) (free)
- Microsoft Office ([Microsoft 365](#) is free for all currently-enrolled ASU students)
- Reliable broadband internet connection

Email and Internet

You must have an active ASU email account and access to the Internet. ASU email is an [official means of communication](#) among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly. *All instructor correspondence will be sent to your ASU email account.*

Technical Support Contact Information

If you are experiencing technical issues, visit the [My ASU](#) “Service Center” tab for immediate support, to review answers to frequently asked questions, or to submit a request for service.

The number for immediate assistance is **1-855-278-5080** with staff available 24 hours/day, 7 days/week to help direct your call. Also see [ASU’s Contact Us](#) page. Known issues and system outages will be shared on [ASU’s System Health](#) site.

Students also have access to several [computing sites](#).

Power and System Outages

In the event of a power outage or other event affecting the ability of the University to deliver ground and online classes, any decision to cancel classes will be announced using the ASU emergency notification system for ground campus students. Ground campus students should register with the [ASU LiveSafe](#) mobile app. Additionally, ground campus and online students can learn about power and system outages on the [ASU System Health](#) site.

Emergency Evacuation Plan

Students should be aware of the evacuation route posted on the exit door of each classroom. Students who cannot walk up or down stairs should notify the instructors as early in the course as possible so the instructors can provide information regarding the location of a designated meeting area on each floor of the building.

Additional Information and Resources

- [School of Sustainability](#) – this course is offered through the School of Sustainability at Arizona State University. Questions about the course should first be addressed with the instructor. If necessary, you can also contact the school at (480) 727-6963 or schoolofsustainability@asu.edu.
- [Career Services](#) – offers assistance to students in choosing their major, setting career goals, interviewing and job hunting strategies. Students pursuing a degree program through the School of Sustainability also have access to a [sustainability career advisor](#).
- [Counseling Services](#) – professional counseling and crisis services for students experiencing emotional concerns, problems in adjusting, and other factors that affect their ability to achieve their academic and personal goals. Support is available 24/7 between campus locations and EMPACT's 24-hour ASU-dedicated crisis hotline.
- [Financial Aid and Scholarship Services](#) – offers information and applications for student funding such as grants, loans, scholarships and student employment.
- [GPA Calculator](#) – students can use this calculator to project their GPA.
- [Health Services](#) – provides non-emergency medical health care to all ground campus ASU students regardless of insurance status. Most visits with a physician or nurse practitioner are free of charge, but fees will be incurred for x-rays, lab results, etc.,
- [Libraries](#) - offers 24/7 access to librarians through "Ask a Librarian" online chat and help by librarians in person at the Reference Desk during most hours the libraries are open.
- [ASU Online Students](#) – students pursuing fully online programs have access to success coaches and additional tips for success.
- [Sun Devil Fitness](#) – offers individual and group fitness opportunities, as well as information on nutrition and wellness, and massages. Use of the general facilities (weights, circuit training and cardio machines) are free, other services (yoga classes, massages) are fee-based.
- [Tutoring and Writing Centers](#) – provides students with academic support services such as tutoring, peer advising, computer assisted instruction, writing support, and supplemental instruction
- [Contact Arizona State University](#) – provides frequently asked question resources and contact information for new questions.

BMY294: How Nature Works Lab

Class Number: 294

Credit Hours: 1

Semester & Year (Start Date – End Date): Spring 2021

Course Day, Time, Location (on ground only): Biomimicry Center, College of Design South (CDS) 126

Pre-requisite: N/A

Co-requisite: N/A

Instructor

Name: Sara Aly El Sayed

Email: saelsaye@asu.edu

Phone:

Office:

Office Hours:

Teaching Assistant (TA)

Name:

Email:

Phone:

Office:

Office Hours:

Syllabus Disclaimer

All syllabi are subject to minor changes to meet the needs of the instructor, school, or class. Every effort will be made to avoid changing the course schedule, but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes. Please check your ASU email and the Announcements on the course site often.

Course Description

BMY294 is a weekly field lab session that provides hands-on exposure to scientific phenomena and methodology in the biomimicry discipline in order to enhance the learning of course material for BMY230. This course is an optional weekly field lab for students who wish the BMY230 “How Nature Works” course qualify for General Students (SG) Natural Sciences. Students will be expected to attend both lectures and field sessions, and complete the related assignments such as written reports of field work to be reviewed and evaluated by the course instructor.

Field sessions topics include Biomimicry iSites (natural observation and scientific recording exercises), understanding signals and responses in nature, detailed flower anatomy and pollinator relationships, and social insect behavior field trips to labs on Tempe campus. These labs will have a focus on the broader introduction to biology from a functional perspective and students will gain a lower-division level understanding of the material. The field session will explore the course topics further through pre-lab research, in-lab projects and assignments, and post-lab reflections. By the end of this course, students will have learned core concepts in biology as well as how these concepts apply to other disciplines.

Learning Outcomes

At the completion of this course, students will be able to:

- Understand the scientific method and application in biology

- Understand key biological concepts and theories, including evolution and biomimicry
- Apply scientific reasoning skills and biological knowledge to applications in design, engineering, and decision-making relevant to your life and to the society and world in which you live.

Course Delivery and Access

Students in this course will meet regularly in the classroom on scheduled days/times. Course content will be delivered through lectures, textbooks, class discussion, and collaborative projects. A textbook is required for this course (see below). Additionally, some course content and assignments will be accessed online in Canvas, which can be accessed by my.asu.edu.

Course Textbook and Materials

Exploring the Way Life Works: The Science of Biology. 2001. Mahlon Hoagland, Bert Dodson, and Judy Hauck. Crown. 233 pp.

Biomimicry Resource Handbook: A Seed Bank of Best Practices. 2013. Biomimicry 3.8. (available digitally through the course).

Supplemental Readings

Other supplemental reading to be provided by the instructor.

Grading Scale

This course will be graded on an A-E scale using a +/- option:

Grade	Percentage	Points Range
A+	97%-100%	150-155
A	93%-96.9%	144-149
A-	90%-92.9%	140-143
B+	87%-89.9%	135-139
B	83%-86.9%	129-134
B-	80%-82.9%	124-128
C+	77%-79.9%	119-123
C	70%-76.9%	113-118
D	65%-69.9%	100-112
E	Below 65%	0-99

30%

Lab participation

Pre-lab preparation and assignments

10%

In-lab projects/assignments

50%

Post-lab reflections and discussion

10%

TOTAL

100%

Communicating with the Instructor

It is important to be prepared for class. Readings relevant to each lecture are posted in the lecture schedule (found on Canvas). Homework assignments posted on Canvas will also help prepare you for the lectures.

The most beneficial kind of interaction with instructors is by visiting during office hours. If you cannot make the office hours, email the instructors and can arrange an appointment.

Submitting Assignments

All time frames used in class follow Arizona Mountain Standard Time (MST). Arizona does not observe daylight saving time (DST) from March through November; therefore, the time in Arizona will not align with other places that are on MST for half the year.

Attendance and Absences

Please follow the appropriate university policies to request absences or accommodations related to [ACD 304-04 Accommodation for Religious Practices](#) and [ACD 304-02 Missed Classes Due to University-Sanctioned Activities](#).

Showing evidence of being prepared for discussions in class, contributing insightful comments, and commitment to class activities will all reflect high course participation that enables others to learn from and with you. You are also expected to make site visits or venture off campus (e.g. to your project partners organization or area) and complete a defined amount of fieldwork as determined by your project plan. Semesters go by quickly. Keeping on task is thus vital for achieving success in this course.

Attendance is required for all sessions, including those scheduled for working in the classroom with the instructor. If you must be absent from a class due to illness or unexpected circumstances, email the instructors to request an excused absence as much prior to class as possible. More than two unexcused absences will result in a grade reduction. Please contact your instructor if you are facing difficulties with attending the course or completing the required course assignments.

Using your phone, computer, or other devices for non-class related purposes during class time or meetings is disrespectful and disruptive to instructors and your classmates. Your attention and active participation is especially valuable in problem and project-based learning, because it is the key to self-directing learning and collaboratively shaping projects, which cannot happen when you are texting or surfing the web.

Late or Missed Assignments Policy

Notify the instructor BEFORE an assignment is due if an urgent situation arises and the assignment will not be submitted on time. Published assignment due dates (Arizona time) are firm. Late assignments are automatically deducted 25% of points unless specific exceptions have been made with your instructor. Please follow the appropriate University policies to request an accommodation for religious practices or to accommodate a missed assignment due to University-sanctioned activities.

Course Schedule *(subject to change: see syllabus disclaimer)*

Module	Lab Projects/Assignments (In-lab)	Assignments Due
1	The importance of observation: iSites (natural observation and scientific recording exercises)	Pre-lab reading
2	Understanding the natural world: designing an experiment and testing a hypothesis	Post-lab reflection from Module 1
3	Evolution exploration: understanding methods of adaptations	Post-lab reflection from Module 2
4	Human design: what works, what doesn't?	Post-lab reflection from Module 3
5	History of Life on Earth and Biological Classifications	Post-lab reflection from Module 4
6	Abiotic challenges field observation activity	Post-lab reflection from Module 5
7	Biotic challenges field observation activity	Post-lab reflection from Module 6
8	Understanding human-caused challenges: climate change, urbanization, invasive species	Post-lab reflection from Module 7
9	Strategies of Cooperation – evolution of sociality, mutualisms and symbioses.	Post-lab reflection from Module 8
10	Movement in nature: long distance migration, central place foraging	Post-lab reflection from Module 9
11	Methods of communication: signals and receivers	Post-lab reflection from Module 10
12	Communication continued: chemicals, pheromones, and swarm behavior	Post-lab reflection from Module 11
13	Biomechanics – movement through air, water, and on land GROUP PROJECT	Pre-lab readings, Post-lab reflection from Module 12

Module	Lab Projects/Assignments (In-lab)	Assignments Due
14	Biomechanics group project work	Post-lab reflection from Module 13
15	Emerging topics in biomimicry and bio-inspired design	GROUP PROJECT, Post-lab reflection from Module 14

In-Lab Field Assignments

- iSites
- Designing an Experiment
- Evolution Exploration
- Human Design Activity
- History of Life on Earth and Biological Classifications
- Abiotic Challenges
- Biotic Challenges
- Human-Caused Challenges
- Cooperation and Symbiosis
- Movement Activity
- Communication: Signals and Receivers
- **GROUP PROJECT**
- Biomechanics

Course Evaluations

Students are expected to complete the course evaluation. Feedback provides valuable information to the instructor and the college and is used to improve student learning. Students are notified when the online evaluation form is available and students can access it through myASU as well. See [Student FAQs](#) for more information.

Use of Personal Electronics During Class

Please turn off or silence cell phones, etc., prior to coming to the face-to-face class sessions, and do not send text messages during class time. If you have an emergency and need to keep in communication with someone, please inform your instructor ahead of time. You may use your laptop to take notes. Do not use class time for emails, chats, web browsing, or other non-class related activities.

How Long Students Should Wait for an Absent Instructor

In the event the instructor fails to indicate a time obligation, the time obligation will be 15 minutes for class sessions lasting 90 minutes or less, and 30 minutes for class sessions lasting more than 90 minutes. Students may be directed to wait longer by someone from the academic unit if they know the instructor will arrive shortly.

Students with Disabilities

ASU's Disability Resource Center (DRC) is the entity that provides services to students with disabilities. If you desire accommodation for this course, [contact the DRC](#) to establish your eligibility and make sure they can provide you with the services you will need for this course. Students with disabilities must meet the same standards, deadlines, etc. as any other student in the course.

Student Code of Conduct and Academic Integrity

Students have the responsibility to understand and follow ASU's [Student Code of Conduct](#) and [Academic Integrity Policy](#). You may face ethical decisions during your time as a student. If you're not sure whether or not something is permitted, it is your responsibility to ask questions or find out by doing more research using the links above. Any violations in this course are subject to sanctions and will be reported to the School of Sustainability and the college or school of your major.

The Office of Student Rights and Responsibilities accepts [incident reports](#) from students, faculty, staff, or other persons who believe that a student or a student organization may have violated the Student Code of Conduct.

Academic Integrity (also known as cheating, copying others' work, or even reusing your own work) falls under the Student Code of Conduct. Possible sanctions for violations include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), suspension, and expulsion.

Beware that some websites promote themselves as tutoring and educational resource sites, but may actually be sites that put you at risk for an academic integrity violation if you are using the services to submit work that is not your own or gain knowledge of what to expect on a quiz or exam.

Important: Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on grounds of suspected copyright infringement.

Disruptive Student Behavior

Students are entitled to receive instruction free from interference by other members of the class. An instructor may withdraw a student from the course when the student's behavior disrupts the educational process per the [SSM 201-10 Instructor Withdrawal of a Student for Disruptive Classroom Behavior](#) and [SSM 104-02 Handling Disruptive, Threatening, or Violent Individuals on Campus](#) policies.

Appropriate online behavior (also known as *netiquette*) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts may be deleted by the instructor.

Prohibition of Commercial Note Taking Services

Course content, including lectures, are copyrighted materials. Students may not share outside the class, upload, sell, or distribute course content or notes taken during the conduct of the course (see [ACD 304-06 Commercial Note Taking Services](#) for more information).

Discrimination, Harassment, and Retaliation

[ACD-401 Prohibition against Discrimination, Harassment, and Retaliation](#), prohibits discrimination, harassment or retaliation on the basis of race, sex, gender identity, age, religion, national origin, disability, sexual orientation, and veteran status. Violations of this policy may result in disciplinary action, including termination of employees or expulsion of students. Contact the Office of Student Rights and Responsibilities at (480) 965-6547, if you feel another student is harassing you based on any of the factors above; contact the Office of Equity and Inclusion at (480) 965-5057 if you feel an ASU employee is harassing you based on any of the factors above.

ASU continues to implement U.S. Department of Education guidance regarding sexual assaults under Title IX federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources on ASU's [Sexual Violence Awareness](#) page.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. [ASU Counseling Services](#) are available if you wish discuss any concerns confidentially and privately.

Add/Drop/Withdrawals Deadline

ASU's [Academic Calendar](#) contains important dates by which you can add or drop this course without penalty called "Last Day to Drop/Add Without College Approval". After this date, if you choose to withdraw from the course, you may do so by the "Course Withdrawal Deadline", but will receive a 'W' on your official transcript. Consult with your advisor and notify your instructor if you have questions about [Drop/Add and Withdrawal](#).

Grade Appeals

Grade disputes must first be addressed by discussing the situation with the instructor. If the dispute is not resolved with the instructor, the student may appeal to the School of Sustainability per the [University Policy for Student Appeal Procedures on Grades](#). See additional instructions for [undergraduate SOS courses](#) and [graduate SOS courses](#) (under Grade Appeal).

Computer Requirements

This course requires a computer with Internet access and the following:

- Web browsers ([Chrome](#), [Internet Explorer](#), [Mozilla Firefox](#), or [Safari](#))
- [Adobe Acrobat Reader](#) (free)
- [Adobe Flash Player](#) (free)
- Microsoft Office ([Microsoft 365](#) is free for all currently-enrolled ASU students)
- Reliable broadband internet connection

Email and Internet

You must have an active ASU email account and access to the Internet. ASU email is an [official means of communication](#) among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly. *All instructor correspondence will be sent to your ASU email account.*

Technical Support Contact Information

If you are experiencing technical issues, visit the [My ASU](#) “Service Center” tab for immediate support, to review answers to frequently asked questions, or to submit a request for service.

The number for immediate assistance is **1-855-278-5080** with staff available 24 hours/day, 7 days/week to help direct your call. Also see [ASU’s Contact Us](#) page. Known issues and system outages will be shared on [ASU’s System Health](#) site.

Students also have access to several [computing sites](#).

Power and System Outages

In the event of a power outage or other event affecting the ability of the University to deliver ground and online classes, any decision to cancel classes will be announced using the ASU emergency notification system for ground campus students. Ground campus students should register with the [ASU LiveSafe](#) mobile app. Additionally, ground campus and online students can learn about power and system outages on the [ASU System Health](#) site.

Emergency Evacuation Plan

Students should be aware of the evacuation route posted on the exit door of each classroom. Students who cannot walk up or down stairs should notify the instructors as early in the course as possible so the instructors can provide information regarding the location of a designated meeting area on each floor of the building.

Additional Information and Resources

- [School of Sustainability](#) – this course is offered through the School of Sustainability at Arizona State University. Questions about the course should first be addressed with the instructor. If necessary, you can also contact the school at (480) 727-6963 or schoolofsustainability@asu.edu.

- [Career Services](#) – offers assistance to students in choosing their major, setting career goals, interviewing and job hunting strategies. Students pursuing a degree program through the School of Sustainability also have access to a [sustainability career advisor](#).
- [Counseling Services](#) – professional counseling and crisis services for students experiencing emotional concerns, problems in adjusting, and other factors that affect their ability to achieve their academic and personal goals. Support is available 24/7 between campus locations and EMPACT's 24-hour ASU-dedicated crisis hotline.
- [Financial Aid and Scholarship Services](#) – offers information and applications for student funding such as grants, loans, scholarships and student employment.
- [GPA Calculator](#) – students can use this calculator to project their GPA.
- [Health Services](#) – provides non-emergency medical health care to all ground campus ASU students regardless of insurance status. Most visits with a physician or nurse practitioner are free of charge, but fees will be incurred for x-rays, lab results, etc.,
- [Libraries](#) - offers 24/7 access to librarians through "Ask a Librarian" online chat and help by librarians in person at the Reference Desk during most hours the libraries are open.
- [ASU Online Students](#) – students pursuing fully online programs have access to success coaches and additional tips for success.
- [Sun Devil Fitness](#) – offers individual and group fitness opportunities, as well as information on nutrition and wellness, and massages. Use of the general facilities (weights, circuit training and cardio machines) are free, other services (yoga classes, massages) are fee-based.
- [Tutoring and Writing Centers](#) – provides students with academic support services such as tutoring, peer advising, computer assisted instruction, writing support, and supplemental instruction
- [Contact Arizona State University](#) – provides frequently asked question resources and contact information for new questions.

Exploring the Way Life Works: The Science of Biology

First Edition

Mahlon Hoagland; Bert Dodson; Judy Hauck

Table of Contents

1. Setting the Stage

- The unity that underlies diversity
- Science as an organized, accessible manifestation of human curiosity

2. Patterns:

- The core of a biology course: the unifying principles that underlie the fascinating diversity of life.
- Science as an organized, accessible manifestation of human curiosity.

3. Energy:

- How living creatures transform energy
- How energy flows through organisms and through communities.

4. Information:

- How the four-letter language of DNA spells out instructions for building millions of life forms.

5. Machinery:

- How DNA's instructions are translated into molecules of RNA and then translated into proteins.

6. Feedback:

- Homeostasis: how cells, organisms and communities regulate internal environments.

7. Community:

- How a cell diversifies into communities of specialized cells, organs, system feedback loops, and how individuals interact and organize.

8. Evolution:

- How the river of DNA information flows across generations
- How the information of DNA is sifted and sorted by cells, and environments.