

# Art & Science: Merging Printmaking and Biology

Fall 2019, M/W 11:15-2:00 (lab time included)

Location: 301 Hanes Art Center (John C Henry Print Studio) and 214 Coker Hall (a Biology lab)

Lab Manager: Mark Soderstrom: [masoders@email.unc.edu](mailto:masoders@email.unc.edu)

## COURSE DETAILS

- 4 credit-hour Honors course (3 credits in ARTS, 1 in BIOL)  
Students must register for both parts of the course — ARTS 409H and BIOL 409L— these are co-requisites.
- Prerequisites: (1) Either a 200-level ARTS course OR BIOL 201 or 202, and/or (2) Permission of instructors.
- 3.0 minimum GPA required for Honors course
- General Education Requirements Satisfied:  
EE (Experiential Education)  
VP (Visual and Performing Arts)

### Professors

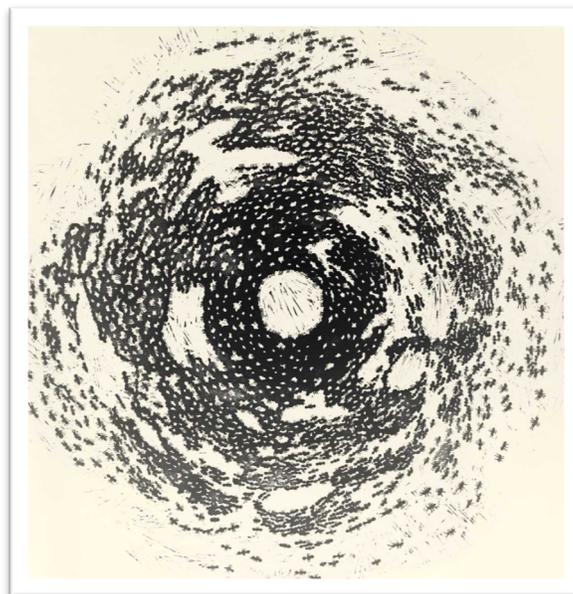
ARTS409H and BIOL409L are both co-taught by professors Beth Grabowski from Studio Art and Bob Goldstein from Biology:

**Beth Grabowski**

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**Bob Goldstein**

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Zita Voros, *Ant Mill*, 2018  
woodcut, 48" x 48"

## COURSE DESCRIPTION/STRUCTURE

The title of this class, Art and Science, implies an intersection of two disciplines. Intrinsic to both is an investment in close observation, experimentation and visual analysis. The course actively considers both meaningful connections between art and science as well as disciplinary differences, especially with regard to what constitutes creative and scientific research and interpretation/analysis of visual information.

ARTS/BIOL 409H/L brings art majors and science majors together to make artwork that arises out of scientific inquiry. Because the class is comprised of students with varying levels of art and science experience, we operate with an attitude of “meeting you where you are at”. Projects are designed with latitude for individual interpretation. You will work hard, but at a level appropriate to your experience.

Units in this course are organized according to topics in biology and begin with science learning, often in the Biology lab. In the process of learning specific biological concepts and practical lab skills, you will gather and generate visual information and pose questions that arise from scientific looking/thinking/analysis. You will augment these lab sessions with individual research appropriate to your science background to both build some science knowledge and generate the source material (images, processes and ideas) for the printmaking projects. This gathering stage of the art project will hopefully generate more than you might end up using in the print projects. You will be free to work with this information in a myriad of ways, including a didactic approach, pure aesthetics, or one that may interpret, expand on or even complicate and question the scientific sources in narrative or poetic manners. We will discuss what these terms and options mean within a broader exploration of the creative process.

In the print studio, the course introduces specific technical approaches to several types of printmaking (relief, stencil and intaglio processes). Students will learn how to make printing matrices (block, screen or plate) and how to print these matrices both in traditional ways and with an attitude of “print strategies” that take advantage of the affordances of printmaking in a more alternative use of printmaking.

Throughout the course, students will engage in artistic ideation to develop images through iteration involving trial and error, critical and aesthetic analysis. While generating ideas and images for projects, we expect students to learn from the professors, from each other, and from readings in both art and science. We expect students to enjoy challenging themselves by considering questions that arise from this merger:

**Questions include:**

- **What are the intersections of biology and printmaking?** What new ideas can arise out of this hybrid?
- **What does it mean to think like a biologist or a printmaker?** How is thinking for science or art different than/same as each other? Both disciplines engage in creative thinking; how does each discipline consider this process? How do we define originality? Creativity and the creative process?
- **How do ideas develop in each discipline, specifically with regard to visual analysis?** What are the similarities and differences in how images communicate scientifically and artistically? What are the didactic and subjective dimensions of imaging? How does a disciplinary framework mediate attention? How do photography, graphic analysis or visual presentations of data function in each discipline? How does a printmaking matrix translate information? How does style, form, scale and context mediate understanding or interpretation?
- **What questions arise out of using scientific process and scientific imagery as a resource for art-making?** What questions and consequences arise from repurposing of scientific information (imagery and data) or process (microscopy, experimentation, etc.) toward artistic ends? Where do scientific and artistic objectives overlap or depart? What about subjectivity? How does it inform our understanding of science?
- **How can the tools and methods of one discipline shape the understanding of a concept in the other discipline?** How can curiosity, adaptive thinking, and repurposing strategies both within each discipline or borrowed from the other reveal new possibilities? It is easier to consider the ways science can inform art-making, but can thinking as an artist benefit the process of research in science, influencing for example the kinds of questions asked in research, or creative experimental design?

**Overview Schedule and Learning Objectives**

TOPIC	BIOLOGY OBJECTIVES		PRINTMAKING/ART OBJECTIVES	
	<i>Concepts</i>	<i>Lab skills</i>	<i>Art concepts</i>	<i>Technical</i>
<b>PROJECT 1</b> Microscopic Worlds  5 weeks	<b>UNDERSTAND:</b> <ul style="list-style-type: none"> <li>• light, optics</li> <li>• microscopic life</li> <li>• biological diversity</li> <li>• biological pattern formation</li> </ul>	<b>EXPERIENTIAL LEARNING TO DEVELOP CAPACITIES:</b> <ul style="list-style-type: none"> <li>• Building a microscope</li> <li>• Light microscopy</li> <li>• Photomicrography</li> <li>• Imaging living materials</li> <li>• Plankton tow</li> </ul>	<b>DEFINE:</b> <ul style="list-style-type: none"> <li>• Formal concepts (Anatomy of a Visual message)</li> <li>• Multiples and variants</li> </ul> <b>DEVELOP CREATIVE PRACTICE:</b> <ul style="list-style-type: none"> <li>• Translating source material</li> <li>• Building images from multiple sources</li> </ul>	<b>RELIEF PRINTING (Linocut/Woodcut)</b> <ul style="list-style-type: none"> <li>• block-making</li> <li>• tool care</li> <li>• printing by hand and with presses</li> <li>• Bonus: Steamroller printing</li> </ul> <b>OPTIONAL/EXPANSIONS</b> <ul style="list-style-type: none"> <li>• collagraph interventions</li> </ul>

<p><b>PROJECT 2</b> Biological Motion  5 weeks</p>	<p><b>UNDERSTAND:</b></p> <ul style="list-style-type: none"> <li>• microscopic and macroscopic biological motion</li> <li>• Inertia,</li> <li>• viscosity</li> <li>• Reynolds number governing biological motion</li> </ul>	<p><b>EXPERIENTIAL LEARNING, TO DEVELOP CAPACITIES:</b></p> <ul style="list-style-type: none"> <li>• Time-lapse and high-speed recording of biological motion</li> <li>• Analyze: Data analysis and visualization using Image-J</li> </ul>	<ul style="list-style-type: none"> <li>• Color Theory</li> <li>• Data visualization &amp; interpretation back to analog forms</li> <li>• Structures to denote time in 2-d (Sequence, series, State-prints, juxtaposition, layering)</li> </ul>	<p><b>STENCIL PRINTING</b> (Screen printing &amp; Pochoir)</p> <ul style="list-style-type: none"> <li>• Layered printing (registration)</li> <li>• Modular printing</li> </ul> <p><b>EXPANSIONS:</b></p> <ul style="list-style-type: none"> <li>• Non-traditional printing substrates (windows, Tyvek)</li> </ul>
<p><b>PROJECT 3</b> Self-directed projects  5 weeks</p>	<ul style="list-style-type: none"> <li>• Understand explored issues in depth, unique to each student</li> <li>• guided tutorial-style through relevant biological literature</li> </ul>	<ul style="list-style-type: none"> <li>• Define, learn, experiment with additional science tools customized to project for creating source material or adaptive process to use in art project</li> </ul>	<ul style="list-style-type: none"> <li>• <b>ADAPTIVE TINKERING:</b> Repurposing image, process and/or structure for artistic end.</li> <li>• The modular print</li> </ul>	<p><b>ADDITIONAL TECHNICAL OPTIONS:</b></p> <ul style="list-style-type: none"> <li>• Photopolymer gravure</li> <li>• Cyanotype</li> <li>• collagraph</li> </ul> <p><b>HYBRID/EXPANDED PRINTMAKING:</b></p> <ul style="list-style-type: none"> <li>• Alternative variables: matrices, Inks, supports (fabric, glass)</li> <li>• Print as means to another end (e.g. stop-motion animation, installation, book forms)</li> </ul>

*Note: Specific deadlines will be given in a calendar for each project. While we hope to keep to this schedule as much as we can, invariably there will be adjustments as the needs of the class and project become known. Updates to the schedule will be announced in class and posted on Sakai.*

## COURSE LOGISTICS, REQUIREMENTS, & EXPECTATIONS

### Information and Communication

**Sakai:** This class has a Sakai site that contains course documents (readings, links to online resources, technical handouts and informational handouts), links to relevant websites and video tutorials, and a forum for announcements. Project e-/portfolios (see below) are submitted in your individual Drop box folder on Sakai.

**One-to-one communication:** Given that the class has 6 contact hours weekly, it is often possible to carve a few minutes out during lab or studio time for simple matters. You have required consultations associated with each project (see below) and both professors are available for additional help as needed; please contact them directly to make an appointment for outside-of-class consultation.

#### Contact Info for after-hours emergencies:

**Life-threatening situations** dial 911.

**Print Studio:** Contact print Lab Manager, Mark Soderstrom (masoders@email.unc.edu) for facilities issues.

**Biology lab:** Contact EH&S for any other lab safety emergencies: 919-962-5507.

## Required Components

### INTEGRATED LAB/STUDIO PROJECTS

Three integrated projects (outlined above) provide the structural backbone of the course.

1. The first project, *Microscopic Worlds*, introduces students to both laboratory and studio environments and sets up the questions that will govern the semester inquiry. Particular emphasis will be placed on the nature of observation and interpretation of visual information.
2. The second project introduces concepts of biological motion and time with additional forms of printmaking. This project specifically looks at the affordances of printmaking and artistic structures to suggest motion (and implicitly, time).
3. The final project turns a great deal of choice over to you. This project asks you to apply and expand on previous learning of concept and/or methodology, toward a project of your own design.

### PROJECT CONFERENCES

For each project you'll have short (5-10 minute) 1 on 1 conversations with each instructor to help you identify a plan as a place to depart from and for setting goals. You must also schedule in-progress consultations. In other words, this amounts to two meetings with each instructor (4 total) for each project.

### READINGS/RESEARCH

Readings, video tutorials, podcasts and other forms of information come from both scientific literature and art sources relevant to each unit. Some of these are assigned to the class as a whole to support whole-class conversations, but most will be individually determined in the planning conferences.

### PROJECT DOCUMENTATION/e-PORTFOLIOS

The digital "e-portfolio" documents all of the work that you produce for each project. Using a program such as PowerPoint, InDesign or other program that allows you to include both image and text, you will collect the components listed below. **You will create one of these files for each project (3 total), that each have the following three components.**

1. **Proposals:** These are brief documents that identify the science ideas that exist as points of departure for the art project. This can exist as a narrative and/or annotated image or video collections. Your commentary should reveal what you have learned about the scientific topics, including insights gleaned from laboratory experience or other data gathering. The proposal then discusses how the science understanding initially informs or intrigues the artistic exploration. It can also include mention of art research/inspiration. It is most helpful to have a preliminary version of this for the initial 1-1 consultations. You may revise it after the first project conferences if your initial idea evolves as a result.
2. **Document finished work.** You will photograph your end product(s) and add it to this file. Photograph any variants that might have come about. You may also include any collateral (sketches, reference images, etc.) or shots of work-in progress that might provide additional information to inform our understanding of your efforts.
3. **Self-evaluations** These are written after each project critique. Your evaluation basically describes how you arrived at the end result, especially how the project evolved as you engaged process. In addition to responding to specific questions from us, this is an opportunity to augment our understanding of your efforts. This is especially important if your end product departed significantly from the proposal—not necessarily a bad thing, just needs some explanation—or if the project did not quite work out as expected. In other words, "failure" can still be a valuable learning experience, you just need to tell us what you learned! You can also comment on anything additional from both in science and art realms, and how it further informed/inspired you—either for the project at hand or on the broader ideas of art/science intersection that is the overarching topic of this class.

*Note: As required for courses satisfying General Education requirements, the writing component of this portfolio must amount to a minimum of 10 pages of writing (about 6000 words), distributed between the three projects. Folks generally don't have a problem meeting this requirement. You can distribute it in any way, but it is up to you to keep track. This writing allows us to assess your learning with regard to both Art and Science and their intersections.*

*Tip: It might be useful to use a text-editing program for initial writing, then once finalized, import it to the portfolio.*

### **Procedure for submitting the e-Portfolio:**

Submit this file to your individual Drop Box folder on Sakai. The portfolio will grow over the duration of the project and you will update the file as you add the components. A specific initial deadline for the proposal will be listed on the project calendar. Post-critique documentation and self-evaluations must be submitted within 3 days of the critique for full credit. Late evaluations receive partial credit. Sakai records when items are posted and this time-stamp determines whether items have been submitted on time.

### **PUBLIC FORUM**

One of the requirements of this class is to share our work in a public forum. This can take the form of an exhibition, or a public presentation of finished work or a demonstration of technique. This year we have been invited to participate in the Chapel Hill “Festifall” event on Saturday, October 12. We have tentatively committed to participating; there are a few logistics to work out, but the plan is to print our large-scale woodcuts with a steamroller. We would like for everyone to make every effort to participate in this, but understand that in a few cases this may conflict with other obligations. If this describes your situation, we can discuss alternatives.

## **Attendance / Workload / Participation**

### **ATTENDANCE POLICY**

Everyone is expected to attend all class meetings, including biology lab sessions, studio presentations and technical demonstrations and open studio time. Attendance is recorded on a daily sign-in sheet. It is your responsibility to sign in on the attendance sheet. **This will be the only record of your attendance.** Up to three absences may be made without jeopardizing your grade, EXCEPT for critiques, which are mandatory (see below). Further absences—*for whatever reason*—will lower your final grade by a half-letter grade per absence. Save your absences for when you really need them such as illness, emergencies or official absences for things like team sports or job interviews.

**Critiques** Formal critiques are scheduled at the conclusion of each project assignment. Failure to participate in the formal critiques *WILL* adversely affect your course grade. If you have some serious problem or official reason as defined by the [UNC Attendance Policy](#) that causes you to miss a critique date, let us know about it as far in advance as possible. If your reason for missing a critique is not one of the officially sanctioned reasons, your work that was due for the critique will be considered late and your project grade will be affected.

### **TIME COMMITMENT**

The average student spends *a minimum* of four hours outside of class each week. Exceptional students will often spend 9 hours (or more) outside of class each week.

### **CLASS PREPAREDNESS & PARTICIPATION**

In a great class, each student is working at her or his personal best, focusing on the intellectual and creative possibilities inherent in the discipline. An intense lab/studio environment—full of hardworking people eager to try new things and to share insights—tends to bring out the best in everyone’s work. The information that flows here is not one-directional from teacher to student; each person in the class has a role in and responsibility toward making the class better. In a class like this, your most valuable feedback will usually come to you via informal conversations and class discussions. To participate fully means making a commitment to your curiosity and sense of exploration.

To be precise about it, make sure you are attending to these specifics:

- Come to class prepared: Readings, preparatory work, etc. done, materials on hand, ideas in *visual* form, and work in progress. We expect you to build an understanding of your creative process and to see evidence of it throughout the course. (We’ll discuss what this means at the beginning of the semester.)
- Participate in critiques with (finished) work and voice
- Cooperate with the demands of a communal shop and lab. Abide by all clean-up rules (see Sakai) and strive to be aware of the shop and lab conditions outside of your own needs; adopt a “leave it better than I found it” attitude with regard to clean-up. Report any problems to the Lab manager or your instructor.

## **Materials**

A separate materials handout will be provided and reviewed on the first day. Costs can vary depending on material choices, but you can expect to spend between \$100 and \$200.

## ASSESSMENT/GRADING

All work done in this class contributes to a comprehensive course grade. In other words, you will get the same end-of-semester letter grade for both ARTS 409H and BIOL 409L. We use the percentages listed below to arrive at the final course grade. Letter grades are based on the typical 10-point scale: 90 and above for A, 80 and above for B, 70 and above for C, 60 and above for D. For grades of A through C, plus and minus grades will be assigned for 3 points on either side of each border (i.e. 87 to below 90 for B+, 90 to below 93 for A-, etc), except that A is the highest possible grade. Attendance may be a mediating factor. All grades are contingent on timely submission of the e-portfolios.

### Grade Breakdown:

Project #1.....	25%
Project #2.....	30%
Project #3.....	35%
Bonus.....	10%

**Project grades** are determined by evaluating the e-portfolio complemented by our understanding of your efforts as we experience them in the class.

**Bonus** This 10% component of the course grade allows us to assesses the overall trajectory of work done in the class. For most students, this can account for growth across the semester. It can also reflect work “above and beyond” in scale, complexity or quantity for any project or acknowledge extra work of revision (see below). It can also reflect a superlative commitment to enhancing the overall learning experience of the class community. You will have an opportunity to make a case for this 10% component of your course grade in the final project self-evaluation.

**Optional Revisions:** Critiques can sometimes provide useful feedback that enables a revision strategy. Although not required, you are encouraged to follow up on feedback if time allows. If you decide to revise, you must present the revision along with documentation of the original and a statement explaining your concept of what has improved the solution. Revisions may be submitted at any time before the final exam (critique) date for this class. Revision is not an option for any work that was late not previously submitted.

**Rubric:** A grading rubric developed specifically to guide our assessment of your work in this class is available in the Course Documents section of the class Sakai site.

## HEALTH AND SAFETY

All students taking classes in the art department are required to take the following online training on health and safety: <https://apps.fo.unc.edu/ehs/training/art-safety/>. To proceed in this class, you must:

1. Take this training and pass the accompanying test with a score of 70 or better.
2. Submit the proof of having successfully taken the test to both your instructor and to appropriate Area Lab Technicians: Mark Soderstrom (printmaking and darkroom photography), Joy Drury Cox (digital labs) and/or Pat Day (Art Lab). *Note: If you are taking multiple art classes, you only need to take the training once, but make sure to send the verification to all your instructors and appropriate lab managers.*

In addition to the training module, please read the handout on Safety (posted on Sakai) and review the shop rules below. The handout emphasizes health and safety issues most relevant to working in this class. Additional instruction for printmaking specific procedures will be given during technical demonstrations throughout the semester.

### General:

- NEVER COME TO CLASS UNDER THE INFLUENCE OF DRUGS OR ALCOHOL.
- Avoid routes of inhalation and ingestion exposure: Do not smoke. Do not eat or drink while working.
- If you do not understand something, ask for help.
- Do not attempt work that is beyond your physical capacity; ask for help.
- Think through an operation before beginning and anticipate what could go wrong. Stay attentive as you work.
- Dress for success! Wear clothes that can get dirty or wear an apron. Avoid loose clothing or jewelry that can be dangerous when working with power tools or presses. No sandals or bare feet in the Printshop.

### **Tools & Equipment**

- Use any tool or machinery in the shop only after you have received appropriate training/instruction.
- Do not use power tools or presses if you are on any medications that affect your ability to focus.
- Wear dust, hearing, and eye protection when necessary. Keep long hair tied back and/or tucked in.
- Be sure on/off switch is in off position before plugging in power hand tools or electrical equipment.
- Be alert for loose parts and/or dull blades. Report damaged equipment to faculty, shop manager or monitors.
- Be alert for unusual sounds when turning on or operating tools.
- Never talk to or distract someone who is working with power tools or machines.

### **Hazardous Materials**

- Use the least toxic solvent for the purpose at hand. Often this is soap and water.
- Wear nitrile gloves to protect hands when working with acids or solvents. Barrier cream can provide additional protection. Do not forget gloves during clean-up operations!
- Use solvents, sprays or any toxic substances ONLY at the exhaust ventilation stations. (use such solvents only with permission and avoid excessive use while classes are in session) Dispose of solvent-soaked rags in the covered containers: Useable soiled rags in the purple cans so marked or in the red safety containers for spent rags. Note: Orange-top purple cans are for water-based useable rags only (screen -printing)
- Use caution with acids: in Lithography, use only at press stations or at the etch-mixing area. Do not set acid dropper bottles on stools! Etching copper intaglio plates must take place ONLY in the acid room

### **Medical/security/safety:**

- Know where the first aid kit is.
- Know the fire escape route.
- Call for 911 emergencies. If you are in doubt always call 911.
- The studio is available 24/7, except during other scheduled classes. Access is only for print students and is controlled by a combination lock on the main door. It is an honor violation to give this code to anyone else.
- Always have your UNC one card available. Campus security can ask unauthorized persons to leave the lab.
- More information on safety measures: <https://safe.unc.edu/learn-more/campus-safety/>

## **COMMUNITY RESPONSIBILITY**

### **Honor Code**

The University of North Carolina at Chapel Hill has had a student-led honor system for over 100 years. Academic integrity is at the heart of Carolina and we all are responsible for upholding the ideals of honor and integrity. The student-led Honor System is responsible for adjudicating any suspected violations of the Honor Code and all suspected instances of academic dishonesty will be reported to the honor system. Information, including your responsibilities as a student is outlined in the Instrument of Student Judicial Governance. Your full participation and observance of the Honor Code is expected. Consult the Honor or further information:

<https://studentconduct.unc.edu/>

Most people understand the ideas that define transgressions of academic integrity; concepts such as lying, stealing, cheating, or plagiarism are well defined in typical academic courses. In art classes, sometimes these concepts need further articulation. A document with specific information regarding academic integrity in studio art classes is available on Sakai. Be sure to read this to understand how the honor code applies to your work in this course.

### **Maintaining a positive classroom environment**

In addition to issues of academic integrity, the University expects all students, faculty and staff to conduct themselves in a manner that supports a positive learning environment. The [Policy on Prohibited Discrimination, Harassment and Related Misconduct](#) outlines the specific behaviors and actions that would undermine this environment. Take a moment to follow the link above to familiarize yourself with this policy.