**Care & Use of Collections (BIOL/MUSE 240)[[1]](#footnote-1), 3 credits (lab not offered this semester)**  
M, W, F 10:00-10:50 a.m.

Stanley 134

|  |  |
| --- | --- |
| **Instructor:** | Heather Lerner, Joseph Moore Museum Director,  Assistant Professor of Biology and Museum Studies |
|  | Office: Dennis 033 |
|  | Email: hlerner@gmail.com |
|  | Office Phone: x1402 |
| **Office hours** | By appointment, or stop in if my office door is open |
| **Pre-requisites:** | Students enrolled in this course should have a **basic background in Biology**, |
|  | **be comfortable reading scientific literature**  and be of **sophomore** or above standing.  To enroll, you **must** have taken **BIOL 111 or BIOL 112.**  Upper-level students outside of biology may be considered on a case by case basis. |
| **Required**  **Supplies:** | You need a [Sakura MICRON 02 #1 archival ink pen](http://www.amazon.com/Sakura-50036-6-Piece-Micron-02-0-30mm/dp/B00K3KRJGA/ref=sr_1_3?ie=UTF8&qid=1408454136&sr=8-3&keywords=micron+02). This pen is required for the first time in class on **Sep 3rd**, and every class thereafter. You can’t complete the Printing Quizzes using any other writing implement.  There are no required texts for this class. We will principally read primary and secondary literature made available to you on Moodle, as hyperlinks, or handed out as needed. If you prefer paper copies, you will be responsible for printing any articles from Moodle and the associated costs. You should supply your own binder and organizational system. |

**Course Description**

Natural history, or biological, collections have provided the foundation for the field of biology and the discovery of the processes that underlie the diversity of life on earth. The importance of such collections over time cannot be overstated. Yet formal training in caring for, expanding, and using biological collections is surprisingly lacking. This course aims to introduce you to the wealth of possibilities that exist in biological collections and the practical responsibilities of preserving them.

As part of a team, you will become intimately familiar with one of the organismal collections in the Joseph Moore Museum. You will gain hands-on practice accessioning specimens into the collection, organizing specimens within the collection, and databasing specimens using the collections software Specify. You will also read examples in the primary scientific literature of how research using natural history collections has made important contributions to our understanding of the natural world.

We will all benefit from a small class size, engaging team-work, and activities using the Joseph Moore Museum collections.

**Learning Goals**

This course will give you the opportunity to add a variety of tools to your professional toolbox. These are skills that will help you become (a) a successful scientist, including a curator or collection manager at a museum, (b) an outstanding coworker and (c) an attractive job applicant:

**Scientific skills you will perform**

* Practical application of taxonomy (Unit I)
* Critically Reading Primary Scientific Literature (Units 3-6)
  + Identify the main question in a publication
  + Place research into a broader context (i.e. why is the research important? Why are researchers interested in answering these questions?)
  + Determine if the evidence really does support the conclusion(s)
  + Know when and which modern techniques to use for studying organisms with voucher-specimens (e.g. DNA analysis, stable isotopes, etc.)
* Presenting scientific content to a general audience (Video project)
* Writing for a scientific audience (Final Project)

**Broader vocational or life skills you will practice**

* Using Modern Technology, including software and hardware:
  + Creating a video presentation, use production and video editing software (Unit III)
  + Using modern database software (Unit I, projects)
* Museum collections care techniques (Units I and II)
* Printing legibly (Units I-III)
* Working in a team (all Units)
* Being organized and observant, paying close attention to detail (all Units)
* Writing a convincing, well-supported grant application (Final Project)

**Course Structure and Team-Based Learning**

This course is comprised of six units within two major sections. The first section of the course will focus on *care* of collections, while the second section will address *scientific* *uses* of collections.

The structure of this course is an adaptation of “Team-Based Learning.” You will be assigned to one team of 4-5 students, and you will work with that team for the duration of the semester. Much of the course work will be done in your team. A large portion of your grade will depend on your team’s work (more on grades below).

Additionally, this course will be largely “flipped.” Unlike traditional lecture courses, most of class time will be devoted to working in teams on applying your knowledge in the JMM collection, case studies, and other activities that reinforce key concepts. Therefore, a significant portion of content learning will occur outside of class. This will frequently involve reading and watching online videos. **Because your first exposure to the material will occur outside of class, it is critical that you do your homework before every class.** Each content-learning assignment will include a detailed guide to help you focus on the key concepts.

This course format has several advantages. First, it facilitates learning if you have ADD/ADHD (or if you simply have a short attention span), because it eliminates the need to concentrate on a lecture for 50 minutes. You can approach learning the content outside of class in whatever way works best for you: one long session or several short reading periods; in a group study session or on your own; in the middle of the night or over lunch. You are encouraged to discover what method works best for you and stick with it. Generally, **I anticipate that you will spend 3 hours preparing for each class** doing homework, reading articles/chapters or watching videos.

Additionally, this course format facilitates deep learning. You will *use* the facts you learn to handle specimens, evaluate collections, design hypotheses, make experimental predictions, and analyze data. In this way you will practice critical thinking and scientific reasoning skills, which are fundamental to any scientific and museum discipline. Furthermore, you will have a deeper understanding of museum collections principles using this approach than if you simply memorized facts.

The course is divided into 6 units. The beginning of each unit will include two “Readiness Assurance Tests” (RATs): an individual test (iRAT) directly followed by a team test (tRAT). You will take the iRAT first. After you and all of your teammates have turned in their answers, your team will take the tRAT, which is the *exact same test*. Your grade will be based on both your individual and your team’s score.

The rest of the unit will consist of application exercises, often in the JMM collections, that your team will complete together, individual writing assignments, and peer writing critiques.

**Attendance and Late Policy**

Attendance is critical to your and your teammates’ success. This course requires hands-on learning during class time; if you miss a class, you can’t “catch up” by getting lecture notes from a peer. Additionally, your team members rely on your contributions, so when you miss class, you impact your teammates’ learning.

Because attendance is so critical to your success, there is a 3-absence grace period. **If you miss more than 3 class periods, you will lose 3% of your total course grade for each additional missed class.** There are no “excused” absences. In the case of extreme circumstances (such as a substantial medical emergency), please talk to me about how you can make up the work you missed and earn back the points that were deducted. **This conversation must happen in person or over the phone**; a conversation over email is not sufficient to earn back points from an absence incurred because of an emergency.

Additionally, it is important that you arrive to class on time. **If you arrive to class more than 3 minutes late, you will be marked as “Late.” Two “lates” equal one absence.**

## Communication

## Communication outside of class will occur largely by email. If you would like to discuss something with me, stop by my office or send me an email. I will typically respond to emails within 48 hours. I will often send communications about the class via email, so please check your email daily.

## Late Homework Policy

**Late homework assignments lose 10% of the entire assignment grade for every day the assignment is late**. The day the assignment is due is considered the first late day. In other words, if an assignment is due at the beginning of class and you turn it in after class on the day it was due, the assignment will lose 10%. If you turn in the assignment the day after it was due, you will lose 20% of the possible points for that assignment.

**Exams**

Exams are strictly individual; there are no team exams. Exams will cover material from pre-class content (including readings from books, articles, and videos), in-class activities, and homework assignments. **Exams may be rescheduled only by my PRIOR approval, at least 2 days before the exam.** In the case of an emergency, contact me immediately. Emergencies will be handled on a case-by-case basis.

## Team Collections-based Video Assignment

Businesses, including the institutions that employ scientists, increasingly have the need to share information in a digital format, including videos, to reach a broader audience. Indeed, some of the major museums are publishing short, fun, informative videos (e.g. the weekly [Brain Scoop](https://www.youtube.com/user/thebrainscoop) at the Field Museum of Natural History). To help you become familiar with this presentation format, in your teams, you will create a **3-5 minute video** that describes your focal museum collection and its scientific importance.

**Audience:** This video is a candidate for posting on our museum’s blog and for presenting at the fall scientific research conference at Earlham College. Therefore, your audience will include diverse members from experts in your taxonomic group to laypersons. You will need to tell an engaging story using accessible language so that a family can mostly understand it, with enough detail to make it worth an expert listening in.

Be sure to **address the following questions**:

* What are the major strengths of the collection, including its size, major collectors, most active time period, and most common localities of specimens. (You should use graphs where appropriate.)
* How are specimens preserved, collected and organized for this type of collection?
* Choose at least one interesting or unique specimen and describe it.
* Describe at least one publication that has used specimens from this collection.

**Learning Goals for the Collections-based Video Assignment** synergize with the course learning goals and are as follows:

* Present scientific information in an engaging way using modern technology to reach a diverse audience—without over-simplifying
* Gather data from the physical museum collections and database software

## Research Grant Proposal (Individual)

For the Research Grant Proposal, you will write a proposal to use museum specimens to answer a research question. To start, you will choose one current paper (published in 2011 or later) on any topic that uses museum specimens to answer a research question—this can’t be one of the papers assigned in class and must be **approved by Heather**.

**Document 1--Background:** Based on this current paper, you will write an introduction for your proposal detailing how the current paper fits within the previous literature. You will identify the current paper’s main question and conclusions, using key evidence from the paper to support the claims, and you will critically identify any weaknesses. 2 pages max

**Document 2--Project Description:** You will identify an unanswered question that is raised by the current paper (from your introduction) and you will develop a project proposal to answer the question using museum specimens. This can be a small project you could accomplish, or a larger project beyond your current capacity. Your project description should address [paragraph #2](http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_2.jsp#IIC2d) of the NSF Grant Proposal Guide’s content section in the requirements for project descriptions:

*The Project Description should outline the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provide a clear description of experimental methods and procedures. Proposers should address what they want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions.* 2-3 pages

**Document 3—Budget:** Prepare a budget itemizing anticipated expenses incurred only by the grant, including supplies and travel, but not salary, that are associated with your proposed project. 1 page max

**For documents 1-3, you should follow the Proposal Margin and Spacing Requirements and Page Formatting in the** [NSF Proposal Guide](http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_index.jsp)

**Document 4—Application Cover Page** (1 page)

Your name

Title of project

Proposed Start Date and End Date (maximum 12 months)

List of specimens you require *and the museums that hold them*

**Learning Goals for the Research Grant Proposal** synergize with the course learning goals and are as follows:

* Connect current research to prior research.
* Demonstrate the ability to read a primary research article and distill the important points.
* Practice asking “What Next” questions and propose experiments to test a hypothesis (demonstrate familiarity with techniques and experimental design).

**Grades**

Your final grade will depend on three factors: Individual Performance, Team Performance, and Peer Evaluation. In the first week, the whole class will determine, by consensus, how much the final grade will be affected by Individual and Team Performance scores. Additionally, the class will determine the weight of each type of assignment. Finally, your Team Performance score will be modified by a Peer Evaluation Score, which is determined by an end-of-course peer evaluation.

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| Grade Component | Percentage | Grading Scale:  A+/A: 93-100  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: <60 |
| **Individual Performance**  iRATs and Printing Quizzes  Homework Assignments  Exams (2 total)  Research Grant Proposal | **60%**  10%  15%  15%  20% |
| **Team Performance**  tRATs  In-Class Exercises  Collections Video | **40%**  15%  15%  10% |
| **TOTAL** | **100%** |
| **Peer Evaluation Score (different for each team)** | Peer Evaluation Score  min = \_\_\_\_\_\_\_  max = \_\_\_\_\_\_\_ |

## Peer Evaluation Score

At the end of the semester, you will evaluate the contributions made by each of your teammates. You will distribute 100 points among your teammates. Team members who contributed more should receive more points than team members who contributed less. For example, in a team of 4 (Mary, Susan, Allen, Peter), Mary may receive the following scores: 30 from Susan, 34 from Allen, and 31 from Peter. Thus, Mary’s Peer Evaluation Score is 30 + 34 + 31 = 95. The Peer Evaluation Score is used to adjust the Team Performance Score. In the example above, Mary will receive 95% of her Team Performance Score.

The entire class will determine the minimum (min) and maximum (max) limits for the Peer Evaluation Score, to ensure that no one receives substantially more or less than their Team’s Performance Score.

## The Earlham Writing Center

The Earlham Writing Center is dedicated to providing Earlham students with advice and resources about writing. Students will meet one-on-one with trained consultants who will contribute feedback to writers at any stage of the writing process: brainstorming, drafting, researching, revising, and polishing. Consultants will begin with the writers’ needs and concerns. Please come prepared with questions and specific concerns associated with your writing – have an idea of what you would like to focus on with the specific piece of writing that you bring in. We will use our knowledge and expertise to teach you how to recognize strengths and weakness so you may effectively improve your own work.

You can enjoy free, walk-in service in the basement of Lilly Library from 8-11PM Sunday through Thursday with additional hours on Sunday from 2-5PM. In addition to dropping by, you may also schedule an appointment up to 10 days in advance using the online scheduler found on the website: www.earlham.edu/writing-center/ . On the Writing Center website you can also find dozens of resources, videos, and presentations to help you with your writing.

## Disability accommodations

Students with a documented disability (e.g., physical, learning, psychiatric, visual, hearing, etc.) must request an accommodation statement from the Academic Enrichment Center and provide a copy to me before learning accommodations can be made. If you need a learning accommodation for this course, you must visit the Academic Enrichment Center within the first two weeks of the semester to begin the process.

## Earlham College Policy on Academic Integrity

 “The College trusts students who enroll at Earlham to be honest seekers of truth and knowledge. This trust is extended to all students by other students and by teachers, and is manifested in a variety of forms. . . Students must be mindful that, although Earlham encourages cooperative and collaborative, rather than competitive, modes of learning, one's work must still be one's own, unless explicitly assigned to a group. Giving or receiving aid inappropriately on assignments and tests, or plagiarizing by using another person's words or ideas without credit, constitutes a serious breach of our trust in one another and in the integrity of the search for truth.”

Learning to think for yourself, assess information judiciously, and speak and write effectively in your own voice is at the heart of a liberal arts education and global citizenship. Treasure and cultivate these skills. Papers and other work, including digital creations, downloaded or copied from other sources, or in which words or ideas belonging to others have been deliberately misrepresented as your own, will receive an automatic F, as they thwart your learning process and damage the integrity of knowledge-discovery. If you have questions about how to find, integrate, and properly cite sources, never hesitate to ask for help.

An excellent place to find help in knowing when and how to cite others' work appropriately can be found on the Libraries page: http://library.earlham.edu/friendly.php?s=academic\_integrity. The site also includes Earlham's full statement on academic integrity and procedures for addressing academic violations of the Student Code of Conduct.

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| **Part I: Care Of Collections (Units I-III)** | | |
|  | Aug 27  Course Intro | Aug 29  **\*\*RAT**  Intro to Nat Hist Collections |
| Sep 1  Intro to Nat Hist Collections | Sep 3  **\*\*RAT**  *Unit I From Collection to Accession* | Sep 5  Meet in Collections (every day for the rest of this Unit) |
| Sep 8  Printing Quiz | Sep 10 | Sep 12 |
| Sep 15 | Sep 17  **\*\*RAT**  *Unit II Collections Management* | Sep 19 |
| Sep 22  Printing Quiz | Sep 24 | Sep 26  Collections Survey Draft Due |
| Sep 29  Collections Survey Due | Oct 1  **\*\*RAT**  *Unit III: Engaging the Public* | Oct 3  Videography Workshop |
| Oct 6   | Oct 8    Videography Project Week | Oct 10   |
| Oct 13  Video Due | **Oct 15**  **\*\*EXAM 1\*\***  (Units 1-III) | Oct 17  No Class: Early Semester Break |

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| **Part II: Use Of Collections (Units III-VI)** | | |
| Oct 20  *Videos Due* | Oct 22  **\*\*RAT**  *Unit IV Biogeography* | Oct 24 |
| Oct 27  Printing Quiz | Oct 29 | Oct 31  **✪Paper Selection Due (Sat)** |
| **Nov 3** | Nov 5 | Nov 7  *Last day to drop a course*  **\*\*RAT**  *Unit V*  *Phenotype or Physical Analysis* |
| Nov 10  **✪** **Background Due** | Nov 12 | Nov 14 |
| **Nov 17**  **✪Project Description Due** | Nov 19 | Nov 21  **\*\*RAT**  *Unit VI Museomics* |
| **Fall Break (Nov 24)** | | |
| Dec 1  *Cont. Unit VI* | Dec 3 | Dec 5  **✪Budget Due** |
| Dec 8  **✪Full Proposal Due** | Dec 10 | Dec 12  *Last day of class*  *Review session* |
| **Dec 15**  **8:00 am**  **Final Exam** |  |  |

**Assignments**

The background information we will be using in class each day is listed here. To be prepared for class on the date listed, you should be familiar with the materials listed under that date *before* you come to class.

All of these materials will be available as links or pdfs on Moodle. Do not rely on the links (or lack thereof) here.

**Introduction to Natural History Collections**

**August 29, 2014 Natural History Collections Introduction**

Natural Sciences Collections Association. (2005). *A Matter of Life and Death: Natural science collections: why keep them and why fund them?*. Natural Sciences Collections Association.

<http://books.google.com/books?id=RJ51AgAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false>

Winker, K. (2004). Natural history museums in a postbiodiversity era. *BioScience*, *54*(5), 455-459.

<http://www.mnhnc.ul.pt/pls/portal/docs/1/335873.PDF>

Winker, K., & Withrow, J. J. (2013). Natural history: Small collections make a big impact. *Nature*, *493*(7433), 480-480.

<http://www.nature.com/nature/journal/v493/n7433/full/493480b.html>

**September 1, 2014 Recent Collecting Controversy**

Minteer, B. A., et al. "Avoiding (Re) extinction." *Science* 344.6181 (2014): 260-261.

Rocha, L. A. et al. “Specimen collection: An essential tool.” Science 23 May 2014: 344 (6186), 814-815.

Krell FT and Wheeler QD. “Specimen collection: plan for the future.“ Science. 2014 May 23; 344(6186):815-6

Minteer, B.A., et al. “Specimen collection: An essential tool—Response.” Science 23 May 2014: 344 (6186), 816.

Winker, K. Reaffirming the Specimen Gold Standard. University of Alaska Museum Dept. of Ornithology <http://www.universityofalaskamuseumbirds.org/reaffirming-the-specimen-gold-standard/>

Brain Scoop Podcast. Where’d you get all the dead animals. Field Museum of Natural History. (5:46)<https://www.youtube.com/watch?v=nS8suhK-c5I>

**Unit I: From Collection to Accession**

**Product from this Unit:** Each individual needs to propose a question and answer it using on-line collections database(s). The result will be a figure or figures that demonstrate the result and a three-minute in-class presentation. The best figures will be assembled into a poster that we will print for the scientific research poster conference.

**September 3, 2014 Collecting and Vouchering**

Chapter 3 - **Challenges and solutions for planning and implementing large-scale biotic inventories** in Volume 8 *Manual on field recording techniques and protocols for All Taxa Biodiversity Inventories and Monitoring*. Belgian Development Cooperation, 2010. <http://www.abctaxa.be/volumes/volume-8-manual-atbi/>

**Bird data paper**

**LATER?**

**The** **changing** **significance** **and** **definition** **of** **the** **biological** **voucher**. In: (Williams, S., & Hawks, C. (2006). Museum studies: Perspectives and innovations. *Washington, DC: Society for the Preservation of Natural History Collections*.

**The type specimen** <https://www.youtube.com/watch?v=gfQL7bXwzvM>

**Flowchart of Typical Specimen Movement Through the MVZ**

**NOT USING:**

**Recording Localities in Field Notes:** <http://mvz.berkeley.edu/Locality_Field_Recording_Notebooks.html>

Chapter 7 - **Organizing specimen and tissue preservation techniques in the field for subsequent molecular analyses** in Volume 8 *Manual on field recording techniques and protocols for All Taxa Biodiversity Inventories and Monitoring*. Belgian Development Cooperation, 2010. <http://www.abctaxa.be/volumes/volume-8-manual-atbi/>

**September 5, 2014 Specimen Handling**

JMM Handling Manual (see Moodle)

Fluid prep demo: <https://www.youtube.com/watch?v=DMpJiTdZWlk>

Handwriting Demonstration

<https://www.youtube.com/watch?v=G-qFgHWlHL0>

<https://www.youtube.com/watch?v=qRfI87CfluQ>

<https://www.youtube.com/watch?v=b7F5ZHO0CL0>

**September 8, 2014 Accessioning**

JMM Specify Handbook

U of Alaska Accessioning Policy

http://www.uaf.edu/museum/collections/ethno/policies/acquisitions/

Specify6 Podcast

Prepare for printing quiz

**September 10, 2014 Georeferencing**

JMM Specify

Georeferencing

🡪I should have used

Graham, Catherine H., et al. "**New developments in museum-based informatics and applications in biodiversity analysis**." *Trends in ecology & evolution* 19.9 (2004): 497-503.

http://academic.uprm.edu/~jchinea/UIP-MAPR/refs/graham\_e2004.pdf

OR

**Integrating biodiversity distribution knowledge: toward a global map of life**

Walter Jetz1, Jana M. McPherson2,3 and Robert P. Guralnick4,5

http://ac.els-cdn.com/S0169534711002679/1-s2.0-S0169534711002679-main.pdf?\_tid=1730f62e-4f22-11e4-a1c6-00000aacb360&acdnat=1412797036\_b9b0182db56865702cb07540a4a22ca1

**September 12, 2014 Inventorying**

Inventory Chapter

**September 15, 2014 Inventorying** cont.

**Unit II: Theory of Collections Management**

**Product from this Unit:** Each individual needs to write a critical issues summary from this unit explaining the position of their collection with respect to agents of deterioration, room for growth, catalog status in Specify. 2 pages. Turn it in on Moodle.

**☐Unit I Questionnaire**

**Wed September 17, 2014 RAT**

**RAT**

**Upload Readings**

**Upload Reading Guide (MADE IT!)x**

**Make Agenda**

**Plan Activity**

**Update Attendance Excel File (rip off chart from team folders)**

**Do:** RAT

Small activity: Take a sample Collections mgmt. policy and the list in box 2 of the Collections Management Chapter in Practical Handbook. Compare. What is not included in this policy that is listed in box 2? What is in the policy that isn’t described in box 2?

NEED LAPTOPS or I print the policy for each group

**Readings**

Collections Management chapter *in Practical Handbook*

Collections Best Practices for AAM

ICOM Ethics document as a resource but not required to read

To use in class--Sample Collections Management Policy:

*Minnesota Science Museum* <http://www.smm.org/collections/policystatement>

This MN Science Museum policy is shorter than Florida’s (below) and is better formatted. It also includes some actual collections care/preservation and IPM

Florida Museum of Natural History: <http://www.flmnh.ufl.edu/collections/policy/>

**Fri September 19, 2014 Start Assessing collection**

**Upload Readings**

**Upload Reading Guide**

**Make Agenda**

**Make Collections Survey Assignment Handout**

**☐PRINTING QUIZ—hand-out for label data**

**grades on presentations**

**Do**: Start an assessment of the collection,🡪use the appendix to do a walk-through with photos.

**Readings:**

Care & Preservation of Collections *in Practical Handbook—*inc. Appendix 1 (for in-class activity)🡪 but this is a long chapter. Even I got bored reading it. So read up to IPM on page 75 for today and Appendix 1.

Also look briefly at Appendix D, but we’ll go over it more in the next reading guide.

**Mon September 22-Friday Sep 26, 2014 Continue Assessing**

**Upload Readings**

**☐Upload Reading Guide—Need IPM done and uploaded**

**☐Make Agenda**

**☐Plan Activity**

**☐PRINTING QUIZ**

**Do**: Basically, you have this week to complete an assessment for your collection. You will have a background focusing on the physical conditions of the building, room and cabinets. Then a section on Light, temp & humidity, pollutants and IPM. You will gather data as a team (that is, photos, charts of rH and temp, bullet points, but NO TEXT), but you will write your own report as an individual. I do not want you to *write together at all*. WHEN IS THE ASSESSMENT DUE???? HOW LONG IS IT??? **Every night you should be going back and writing up your notes from the day and then watching the videos and printing off the info for the next day. Don’t wait until the weekend to write everything up or you will be swamped. You want to basically write 2 pages per day, so you end up at 6 pages maximum. I’d be happier with 4-5 pages (not inc. photos)**

Read out the temp/humidity charts for your collection🡪add it to the collections assessment data you are collecting

One on of the days—**WEDNESDAY**!, set up a fake pest infestation and they have to ID what it is and figure out what to do about it. (it should be dermestids….)

**Assign**:

Care & Preservation of Collections *in Practical Handbook* page 75 (IPM section) to 83. Then go to AMNH Nat Sci Collections Conservation Conservation Lab page: <http://www.amnh.org/our-research/natural-science-collections-conservation/about-the-amnh-natural-science-collections-conservation-lab>

UV Light page: <http://www.amnh.org/our-research/natural-science-collections-conservation/general-conservation/preventive-conservation/light-ultraviolet-and-infrared>

IPM: <http://www.amnh.org/our-research/natural-science-collections-conservation/general-conservation/preventive-conservation/integrated-pest-management>

read someone’s IPM plan: <http://museumpests.net/ipm-policy-and-procedure-example-documents/>

Temp/Humidity page: <http://www.amnh.org/our-research/natural-science-collections-conservation/general-conservation/preventive-conservation/temperature-and-relative-humidity-rh>

Pollutants page: <http://www.amnh.org/our-research/natural-science-collections-conservation/general-conservation/preventive-conservation/pollutants>

**Mon September 29, 2014 Present Assessment** using Theory of Collections Management

**☐Upload Readings**

**☐Upload Reading Guide**

**☐Make Agenda**

**☐Plan Activity**

**Do**:

I lecture a bit on the theory of collections management paper, describing the different axes and what they mean.

Then the team smeet and plot their collections on the board for 10 inutes. They each get 3-4 min to present their collections to the entire class. Each team grades the other team’s presentation.

**I also plotted their collections and so did AE, so I was prepared for this.**

One could do this activity IN the collections rooms and then meet in the hallway where I set up a chalkboard to share answers (or use the giant notepads)

Their individual assessments are due on Tuesday by midnight

**Assigned for today**:

Theory of Collection Management

**Unit III: Public Engagement**

**Product from this Unit:** Engaging Public Video using the museum collections

**How I selected the first day’s readings:**

Because this is a natural history collections class, I think it is fair game to **cover science communication/engagement** instead of just visitor engagement in a museum with this reading. And there is some incredibly exciting fresh stuff out there, particularly at <http://www.cultureofscienceengagement.net/>. But, I want to give them an easy-to-read introductory article couched in some peer-reviewed, agreed-upon, theory.

I also want to use Nina Simon’s stuff, because she is so revolutionary. But her first chapter on Principles of Participation is a wandering mess. It’s captivating and exciting, but nearly impossible to write test questions from. The important points are seriously hidden throughout the text and took me a very careful reading to tease out (and I’m not sure if I have all the points, or even if the points I found are the ones that Nina would want us to focus on…I don’t know how to prioritize the “principles” either!).

I could use Surrounded by Science: Learning Science in Informal Environments, which is easier to read than the other “Learning Science in Informal Settings” People, places and pursuits” from which the first is derived. But again, that is seriously science-based instead of museum-based. Chapter 3 *Design for Science Learning: Basic Principles* is pretty good. But I think at least one of these students has already read this chapter in AE’s class on Science in Informal Settings. And it is a long, long chapter. Actually, they both are long chapters.

**So, I think I’ll go with chapter 5 of Learning Science in Informal Settings, which is about science learning in designed settings, like museums.** It is also long, so I’ll have to reduce it? I am choosing this at last, because it introduces the research as best we know it right now. I want to lay the groundwork here and then rock their world with **Nina Simon** and the “culture of science engagement” report later…or maybe also on this same day if I use the tedex of Nina Simon!

**Notes on the whole unit’s Readings/Resources:**

In this unit I want them to read material at an introductory level about **science learning in designed settings**, then I want them **to hear from Nina Simon** (day 1) and maybe also **her intro chapter in the Participatory Museum** (on two different days is good, so day 3), then I want to have them get into that **crazy report on science engagement** (day 4), which is the next step after Nina Simon. And, finally, I want them to **watch some kick-ass videos** (one per day? Or **lump all at the beginning** to get them going?). I think it would be helpful for them to read about **principles of making good science videos** (day 2) before they make their own video (Day 5 and Day 6 no homework so they focus on the video). Oh dear, just found this video “[Museums Do That](https://www.youtube.com/watch?v=ZVflfF-Pb7I&list=UUZJLpFO1hfrKjzgRV53RHbQ)” at the AAM youtube (4:48) site. That has some cool examples of museums reaching people…it’s not super content-heavy, though…I guess skip it…it also makes me cry.

I also want them to think about ways beyond videos that engage the public. The example of the [olinguito as citizen science](http://smithsonianscience.org/2014/08/crowd-sourcing-olinguito/) is a good one. I also want them to see an example of crowdsourcing by Having them help with “Notes from Nature” (filling out labels online) and the Smithsonian has some transcription of field notes up that can be done https://transcription.si.edu/

**Day 1 Wednesday Oct 1:** science learning in designed settings; **RAT and tour with Carol**

**Day 2 Friday Oct 3:**

* Evolving Culture of Science Engagement [report on science engagement](http://www.cultureofscienceengagement.net/2013convening/report/);
* principles of [making good science videos](http://www.discoveryeducation.com//what-we-offer/curricular-resources/science-supplemental/index.cfm),
* kick-ass videos for inspiration—Emily Graslie BrainScoop [What the Function](https://www.youtube.com/watch?v=9xBxhgMkETU&index=10&list=UUkyfHZ6bY2TjqbJhiH8Y2QQ),
  + Earth Unplugged, [top 10 snake facts](https://www.youtube.com/watch?v=DU9drPR7zXc);
  + Woodland Park Zoo [We know what bears like](https://www.youtube.com/watch?v=h1e6OGIYqn4&index=31&list=UUGrVG0BmCoU1ROg-T3XN7CA);
* then they rank each one according to the criteria in “making good science videos” and the dimensions of change from
* **WORKSHOP with ITAM**

**Day 3 Monday Oct 6**: [TedExNina Simon](https://www.youtube.com/watch?v=aIcwIH1vZ9w), [intro chapter in the Participatory Museum](http://www.participatorymuseum.org/chapter1/),

**Day 4 Wednesday Oct 8:** [olinguito as citizen science](http://smithsonianscience.org/2014/08/crowd-sourcing-olinguito/); also [video on Olinguito](https://www.youtube.com/watch?v=074AGwZF8ho)– do a Notes for Nature and submit a screen capture kick-ass videos—students nominate some! Or, StoryCollider and Infinite Monkey Cage (everything not green is uploaded as of

**Day 5 Friday**: no homework, work on video

**Day 6** **Monday**: no homework, work on video, it’s due the Monday after break

**Day 7 Wednesday**: Exam I—you may not work on your videos on Tuesday! You must study for the exam. You have all of break to work on editing of the video, so make sure you get all your shots videoed before then if at all possible.

This is really busy, so we are going to put off the herp labels until later.

**☐Unit II Questionnaire**

**Wed Oct 1, 2014 Unit III day 1**

**Upload Readings**

**Upload Reading Guide**

**☐Make Agenda**

**Plan Activity—Museum Tour with Carol**

**RAT**

**Do**: RAT and Museum tour with Carol talking about visitor Engagement

**Assigned for today**: chapter 5 of Learning Science in Informal Settings

**Friday October 3, 2014 Videography Workshop**

**Upload Readings**

**Upload Reading Guide**

**☐Make Agenda**

**Plan Activity—Videography Workshop**

**☐Make Handwriting Data sheet for Herps**

**Do**:

Create an outline of points you want to hit for your collection to bring next time

Video Script**,** including description of shots, specimens to use, and timing

reading/video on permits/policies for RAT—Museum Registration Method Chapters

**Mon October 6-10, 2014 Videography Project**

**Upload Readings**

**☐Upload Reading Guide—uploading to youtube as of fri, sep 26th**

**☐Make Agenda**

**☐Plan Activity**

**handwriting quiz—herp labels**

**Do**: Each day we have a short discussion of the readings or where they are at with their project? And then they get to work? This seems to be working well in the survey section of Unit II.

Turn in Individual outline at beginning (need one copy for me, one copy for group—they could upload this for me…)

Group outline is due at the end of class

🡪they need laptops to work on this

**Assigned**: Group outline

In this unit I want them to read the RAT stuff about **science learning in designed settings**, then I want them **to hear from Nina Simon** (day 1) and maybe also **her intro chapter in the Participatory Museum** (on two different days is good, so day 3), then I want to have them get into that **crazy report on science engagement** (day 4), which is the next step after Nina Simon. And, finally, I want them to **watch some kick-ass videos** (one per day). I think it would be helpful for them to read about **principles of making good science videos** (day 2) before they make their own video (Day 5 and Day 6 no homework so they focus on the video). Oh dear, just found this video “[Museums Do That](https://www.youtube.com/watch?v=ZVflfF-Pb7I&list=UUZJLpFO1hfrKjzgRV53RHbQ)” at the AAM youtube (4:48) site. That has some cool examples of museums reaching people…it’s not super content-heavy, though…I guess skip it…

**Mon October 13, 2014 review session for the exam and filming time—ask if they want Wes here again**

**No Readings**

**No Reading Guide**

**☐Make Agenda**

**☐Plan Activity—watch videos and vote (make a voting spreadsheet)**

**Do**: Can we watch these on a big screen? No other good places to watch these on campus☹

**Assign**:

**Wed October 15, 2014 Exam on Units 1-3**

**☐Upload Readings**

**☐Upload Reading Guide**

**☐Make Agenda**

**☐Plan Activity**

**Do**:

**Assign**:

**SCIENTIFIC USES OF COLLECTIONS**

**New set of units—planning thoughts**

Now we move into the Uses of museum collections section. We have time for three units. The general idea is to start with a **review article** and then delve into the field with a series of simple to more complex articles. I also want some sort of **applied paper** in each unit, something about species invasions, or climate change etc. I want to have them still thinking about public engagement and science communication, so I also want to have **blog posts** about the articles and **press releases**.

\* I need to leave time when they are working on their grant project so that they aren’t reading new material and writing up their proposal at the same time. I

**Unit IV: Biogeography, insights from Museum Collections**

**Product from this Unit:** Paper selection for their grant proposal

**Wednesday (Oct 22):** RAT, activities on types of data (presence-only, etc)—I need to make sure they really understand what they are getting into here, so best spend some time doing activities🡪what if I give them a paper in this field and they have to put it into that Table 2, 🡪first, give them one example that addresses methodology or false absences in each way (no, verbally, statistically) and then give them a paper that isn’t in the Table and they have to put it into the table properly—this should be a paper we are going to read

Mammals in Yellowstone is statistically—statistically

Need a verbally--verbally

And a No—no🡪but I wanted these to be papers that used specimens, so I had to pick a verbally-no and a no-verbally and a no-no.

\*only need to give them the methods section!

**Friday (Oct 24):** 3 activities on the review article

**Monday (Oct 27):**

**We are also finishing up activity 2 from Friday**…

**Wednesday (Oct 29):** *Paper 1*—introduce figure facts and message box (have them do the message box as part of their Reading Guide), then do the figure facts as a team activity (maybe they have to agree on the N take-home points and then select which figure best supports that conclusion after they do the figure facts exercise and they can all get graded by each other on that part).

**reading guide** where I talk about how scientists get funding (maybe a little of museum funding specifics for collections), what is the grant application process like and what are success rates

**In class, they have to find a** request for proposals from N types and then summarize the solicitation (who is eligible, how much is it for, due date, length of proposal in pages and how many years the award is good for, what types of work can be funded and what can’t).

maybe I give them a whole bunch of abstracts, or a bunch of review articles and have them start thinking about their proposals and finding articles –or, I can have my binder of papers in the office and they can look at it on their own

*Paper 3*—this can be kind of complex and we spend two days

**Friday (Oct 31, Halloween!):** Either they meet with me alone for 10 minutes, or they have time to find their next two papers during class while I’m there to help guide them

**Paper Selection DUE—I think they need to have at least 3 articles and only one can be a review article , upload to Moodle**

**Monday:** *Paper 2 and 3?*

**Unit V: Stable Isotope Analysis (of Museum specimens)**

**Product from this Unit:** Background (2 pages) for their grant proposal AND Project Description first draft—this means losing basically an entire day (2 half-days) to peer editing

**Friday (Nov 7):** RAT—this is a very simple RAT that aims to test their understanding of what isotopes are, what stable isotopes are, how they are measured and what fractionation is and what fractionation factors are. Then I need to give them some idea about bioaccumulation of stable isotopes using the fish/trophic level figure and walk them through Figure 2 in Ben-David and Flaherty. Have them spend a lot of time on Figure 2. Maybe answer the questions about that paper that I quizzed them on later in the week

Monday (Nov 10): Project Background is DUE—peer edit at least one using a handout;

We did an activity of reading the Bond and Jones (2009) together and making a list of the pitfalls and solutions in stable-isotope analysis. Best to give them a bulleted but uncompleted list to guide their discussion🡪next year have them read Ben-David and Flaherty up to Page 319 (stop at “What determines Isotopic discrimination factors in animal tissues” Do activities on the tables and figures.

**Skip this next year:** Bond, ALEXANDER L., and I. L. Jones. "A practical introduction to stable-isotope analysis for seabird biologists: approaches, cautions and caveats."*Marine Ornithology* 37 (2009): 183-188.

**Just use this:** Ben-David, Merav, and Elizabeth A. Flaherty. "Stable isotopes in mammalian research: a beginner's guide." *Journal of mammalogy* 93.2 (2012): 312-328.

Wednesday (Nov 12): Read the rest of Ben-David and Flaherty (2012) which reviews stable isotopes and fractionation and takes stable isotope analysis a step further by applying it to mammalian research with lots of example figures of stable isotope plots and introducing enriched stable isotope studies. I am in love with the sequence of Monday’s basic intro and today’s deeper level! When they read it, they have to take the bulleted list and find those ideas in the new paper and then add any new concerns/solutions. **Activity 1:** They will come to class with that and talk it through and put it up on their board—just which of the bullets are not repeated and what are the new ideas. Activity 2: They will take the figures (Table 2—variation within tissues; Figure 3—effects of physiological, biochemical and behavioral processes on stable isotope ratios; Figure 4—how to verify signature of diet items is unique; Fig 5—effects of atmospheric CO2 over time; Fig 6—using enriched stable isotopes, you can investigate metabolic rates; Fig 7—use natural abundance and artificially enriched stable isotope analyses to investigate effects of body condition; Fig 8—address migration and dispersal using both types of isotopes)

Did a Pop Quiz on Ben-David and Flaherty, started the activity of what bullet point each figure is emphasizing

Ben-David, Merav, and Elizabeth A. Flaherty. "Stable isotopes in mammalian research: a beginner's guide." *Journal of mammalogy* 93.2 (2012): 312-328

Friday (Nov 14): this should be a long article that we can use both on Friday and again on Monday for a shorter activity after peer-reviewing their project descriptions

We continued the bulleted list activity, applying it to Ben-David and Flaherty.

This cave bear article was really difficult. I should have put the petrel paper first! And maybe not done this article at all!!

Bocherens, Hervé, et al. "Niche partitioning between two sympatric genetically distinct cave bears (*Ursus spelaeus* and *Ursus ingressus*) and brown bear (*Ursus arctos*) from Austria: Isotopic evidence from fossil bones." *Quaternary International* 245.2 (2011): 238-248.

Monday (Nov 17): they turn in their project description for peer editing (I don’t tell them we are doing that this time, I’ll print them before class); we do another activity on the Friday paper🡪they didn’t turn in the description, I just finally got them back comments on their backgrounds! (I hadn’t gotten them until Wednesday late night)

We ended up finally starting the cave bear paper and got through the results activity—which they nailed!

Wednesday (Nov 19th): we read another paper about stable isotopes and do some awesome activities

We will do an activity on the discussion of the cave bear and then get to the petrel paper—this will be a busy day! Luckily there aren’t too many figures in the Petrel paper.

Readings (not including the RAT):

~~Bond, ALEXANDER L., and I. L. Jones. "A practical introduction to stable-isotope analysis for seabird biologists: approaches, cautions and caveats."~~*~~Marine Ornithology~~*~~37 (2009): 183-188.~~

Ben-David, Merav, and Elizabeth A. Flaherty. "Stable isotopes in mammalian research: a beginner's guide." *Journal of mammalogy* 93.2 (2012): 312-328.

~~Bocherens, Hervé, et al. "Niche partitioning between two sympatric genetically distinct cave bears (< i> Ursus spelaeus</i> and< i> Ursus ingressus)</i> and brown bear (< i> Ursus arctos</i>) from Austria: Isotopic evidence from fossil bones."~~*~~Quaternary International~~*~~245.2 (2011): 238-248.~~

Wiley, Anne E., et al. "Millennial-scale isotope records from a wide-ranging predator show evidence of recent human impact to oceanic food webs."*Proceedings of the National Academy of Sciences* 110.22 (2013): 8972-8977.

**Unit VI: Museomics**

What do I want them to get out of this unit

* Phylogenetics**—Need to know how to read a phylogenetic tree, will need some vocab as well**
  + use DNA AND morphology to ID a new species. (Olinguito)
  + Versus: Use DNA to place a recognized species within a phylogenetic context (passenger pigeon and/or ivory-billed woodpecker)
* Ancient Population genetics or phylogeography—**need to know how to read a haplotype network**
  + Can identify barriers to dispersal
  + Can estimate effective population size changes and genetic diversity changes over time either from natural environmental change or anthropogenic causes (albatross)
* Combine stable isotope analysis with DNA! (albatross)
* Other ways to use ancient DNA from the Foote et al paper 2011
* Sources of ancient DNA, it’s not simple and you have to be careful! It is destructive sampling

**Friday (Nov 21st):** Carmen administers the RAT on DNA analysis (not necessarily ancient at this point) and does an activity doing the next 10 questions in the tree-thinking challenge while I’m at a conference at Oxford

They’ll read the understanding phylogenetic trees paper and they’ll need some of the Berkeley site

They could take the phylogenetics misconceptions quiz—OR, they could work through Berkeley’s evolution website and take the misconceptions quiz on the youtube video

**RAT Reading**

Gregory, T. Ryan. "Understanding evolutionary trees." *Evolution: Education and Outreach* 1.2 (2008): 121-137.

**Youtube test yourself on tree-thinking interactive youtube:** [http://evolution.berkeley.edu/evolibrary/search/lessonsummary.php?resource\_id=474&topic\_id=2&sort\_by=resource\_title&keywords=&type\_id=&thisaudience=13-16&pr=0&status=thanks](http://evolution.berkeley.edu/evolibrary/search/lessonsummary.php?resource_id=474&topic_id=2&sort_by=resource_title&keywords=&type_id=&thisaudience=13-16&pr=0&status=thanks" \t "_blank)

**Para poly monophyletic video:**

<https://www.youtube.com/watch?v=ymySM8C1px8>

**graphical depiction of para poly monophyly**

http://www.ucmp.berkeley.edu/glossary/gloss1/phyly.html

**Monday (Dec 1):** BACKGROUND and DESCRIPTION are DUE—Peer edit half of the time

ivory-billed woodpecker would be a good one because it is very short and simple. Could do the Passenger Pigeon at the same time because they are so short. Good to start with phylogenetics.

**Wednesday (Dec 3):**

this is a review article, so should be a good second article (no message box, so need to find some other way they should be preparing) and it moves DNA analysis into ancient DNA, but only has 2 figures and 1 table, one figure is a photo

Foote, Andrew D., Michael Hofreiter, and Phillip A. Morin. "Ancient DNA from marine mammals: studying long-lived species over ecological and evolutionary timescales." *Annals of Anatomy-Anatomischer Anzeiger* 194.1 (2012): 112-120.

**Friday (Dec 5):** BUDGET IS DUE also Olingo

Helgen, Kristofer M., et al. "Taxonomic revision of the olingos (Bassaricyon), with description of a new species, the Olinguito." *ZooKeys* 324 (2013): 1.

**Monday (Dec 8):** Either back to the future: museum specimens in pop gen OR page on haplotype diagrams in textbook AND albatross

Wandeler, Peter, Paquita EA Hoeck, and Lukas F. Keller. "Back to the future: museum specimens in population genetics." *Trends in Ecology & Evolution*22.12 (2007): 634-642.

Eda, Masaki, et al. "Inferring the ancient population structure of the vulnerable albatross Phoebastria albatrus, combining ancient DNA, stable isotope, and morphometric analyses of archaeological samples." *Conservation Genetics*13.1 (2012): 143-151.

**Wednesday (Dec 10):** Elephant seals

**Friday (Dec 12):** Review Session –do this as an activity so I’m not lecturing. Assign each group a unit and tell them to come prepared to outline the important points of the unit

1. ## Some text, specifically regarding team-based learning, is borrowed from Jayme Dyer’s syllabus for Signal Transduction in Cell Biology (BIOL 382) Spring 2014.

   [↑](#footnote-ref-1)