OAS Fall 2011: Instructions for Science and Humanities Inquiries (Inquiry 2 calendar)

The second inquiry for OAS should be completed over a four week period from September 9 through October 10. About half of you will perform an independent experimental science inquiry and the rest will perform an independent humanities inquiry. (For inquiry 3, which will be completed between October 7 and November 7, your inquiry assignment will be reversed.)

As you engage your second inquiry you will note that greater direction is being provided. You will still develop your own original idea but we expect a considerably more sophisticated report given this additional guidance and access to the sophisticated tools of a research university.

Once you have identified your inquiry type from the cohort assignment table below, direct yourself to pertinent documents that describe your instructions, format and required skill module.

Materials to be found in this information packet:

- A list of inquiry assignments by cohort

- Recommended Humanities Inquiry Calendar
- Humanities Inquiry Instructions
- Required Bibliography Skill Module for Humanities Inquiry

- Recommended Science Inquiry Calendar
- Science Inquiry Instructions
- Science Inquiry Format Instructions
- Required Measuring Device Skill Module

Humanities Skill Module	**Science Skill Module**
Allen Cohort	Kuperman Cohort
BerdanierCohort	Law Cohort
Bisewski Cohort	Manthuruthil Cohort
Cacciatore Cohort	Maples Cohort
Cameron Cohort	Mehta Cohort
Chang Cohort	Popat Cohort
Fraden Cohort	Ritter Cohort
Gaddam Cohort	Tien Cohort
Kauffman Cohort	Upadhyay Cohort

Recommended Calendar of Assignments and Deadlines

	Humanities Inquiry	Science Inquiry
September 9	Inquiry assigned	Inquiry assigned
Week of 9/12-16	Library tours, inquiry idea	Intro to BME lab, Inquiry idea
September 18 at 5 pm	Proposal idea approval deadline	Proposal idea approval deadline
September 19-23	Bibliography skill module	Measuring Device skill module
September 25 at 5 pm	Required skill module due	Required skill module due
September 26 to September 30	Collections/library work	BME lab work
October 3-7	Collections/library work	BME lab work
October 10	Inquiry Assignment due	Inquiry Assignment due

OAS Inquiry: Humanities-- Independent Historical Contextualization and Evaluation

How does an object's historical and cultural context affect its meaning?

This inquiry asks you to consult an artifact in a UT archive to investigate the way its various appearances may relate to its historical and cultural contexts.

Your job is to account for two different versions of the "same" object in one of our campus archives. These archives are as follows, and you may pick any *one* of the five in which to pursue this project: (1) the Harry Ransom Humanities Research Center ("HRC," for short); (2) The Nettie Lee Benson Latin American Collection ("Benson"); (3) the Perry-Castañeda Library Map Collection ("PCL Map Collection"); (4) The Blanton Museum of Art ("Blanton"); (5) LBJ Presidential Library ("LBJ"). Please note: you are **not** expected to find the same object in two *different* archives; once you select an archive, the majority of your work will be done there.

This object can be a book, poem, speech, painting, sculpture, map, etc. What you select is entirely up to you, with four ground rules. First, you must of course *do no harm* to the object. This means following the archive's rules regarding proper conduct in the reading or viewing room. Second, *if you choose a written text, both versions must be in a language or languages you happen to be fluent in.* Third, the versions of your object should be separated from each other by at least a decade. Fourth, you may not circumvent the goals of the assignment by consulting only a digital copy of the object (including maps, texts, pictures, etc.). If, however, the archive allows you to take digital photographs of your object, you may do so to have a reference copy. Always check in advance about photography, though, as sometimes you may be allowed to take photos only if you turn off the flash and sound mechanisms on your camera.

A word about your time. It will be difficult if not impossible to do this inquiry in one visit. After you have obtained a reader's card (that is, if a card is required for admission to your archive), plan on visiting your archive several times: at least once to select and look over your objects, and at least once to revisit them after you've had a chance to reflect upon them from a distance, thinking of further questions that you might ask of them.

This inquiry asks you to examine and analyze your object in relation to the specific historical and cultural contexts it first appeared in. In short, place an explanatory "frame" around your particular artifact, accounting for its different versions by making recourse to historical and cultural information about its moment(s) and place(s) of production. You will write an essay (described in the following paragraphs) setting out what your research has uncovered.

One way to fulfill this inquiry (there are many) would be to select a text or other object in some historically distant form (perhaps its "original" published form or some other interesting older or different form) as well as a more recent one. For instance, think about a Victorian illustrated edition and a modern trade paperback of the "same" story. (*Is* it the same story?) Or two paintings of the Madonna from different decades or centuries. Evaluate the differences between the two. If looking at a book, you should pay particular attention to things that English classes usually leave out—what one could call the object's "paratextual" materials. These may be elements of material design, production value, and apparatus: notes, biography of author, introduction, cover blurbs, jacket, etc. Describe the two texts and discuss their differences from each other. How are they and are they not the same "book"? Such questions could easily be adapted for an illustration, painting, poem, play, novel, speech, map, textbook etc., from two different time periods. The only rule of selection, once again, is that you have command over the language(s) your object requires.

This project moves us into the confines of the library and specific research centers on campus. In doing your inquiry, you are to use both online and print resources in some combination. Finding out something about the original moment of your text's production will be required, though you do not have to concentrate on that

particular edition or format. Give a short history of the production or publication of your object. In order to contextualize the two versions, you may have recourse to some secondary materials discussing your text, online exhibits, digitized facsimiles, etc. *Nota bene*: Confining your research merely to materials available full text online will result in a strike – you must hit the library shelves in the PCL, Benson, or the HRC in some way. Paper is your *friend*, and Google—while not exactly an enemy—is something like a creepy neighbor who steals your newspaper in the morning. Don't trust it.

Finally, in a brief search of the critical materials devoted to your text, locate a current scholarly debate about your object. How might the debate shed light on your object's status as an artifact? Can you find a way to bring your bibliographic analysis of the two versions into relation with the scholarly discussion of the text?

Formal Requirements of this Humanities Paper:

1) This paper must include a bibliography of *all* sources consulted and present them in the appropriate format. Only reputable sources may be cited – no personal webpages or Wikipedia entries! See the *Chicago Manual of Style*, available in the PCL Reference Room (PCL Reference Z 253 U69 2003), for information on bibliographic format. A college writing manual such as Diane Hacker's A Writer's Reference, will also have this information in condensed form.

2) The paper must be written in the objective third person. This is not a personal missive, a diary entry, blog, or informal letter. We therefore expect a discussion about the object rather than what "I" did or what "you" will find. Active verbs will help lend force and clarity to your writing.

3) The paper must be proofread, copyedited, printed (in double space in a font no smaller than 12 point), and stapled. Pagination tends to be a good idea too. Papers with significant errors of spelling, punctuation, or grammar will be returned unread.

OAS Skill Module Required for the Humanities Inquiry: Annotated, MLA Style Bibliography

This skill module must be completed at least one week before you turn in your humanities inquiry.

Original thought in the humanities requires exhaustive research concerning the topic you intend to analyze. You may find as you do research that you have trouble remembering which source made what argument. A detailed annotated bibliography will help you keep track of your sources and will make referencing them in your paper much easier. This skill module requires you to begin your research for your humanities inquiry. You will turn in an annotated bibliography of at least **six secondary sources you will cite in your inquiry**. Keep your internet sources to the limit prescribed in the inquiry instructions.

What is an annotated bibliography?

A bibliography is first and foremost a list of the publishing details of the books, journal articles, and websites you use in your inquiry or paper. These details allow the readers of your work to verify your claims and check up on the quality of your references. You must list every source you utilize in order to avoid plagiarism An *annotated* bibliography is a list of the relevant sources you have read in alphabetical order by author's last name that includes a brief description of the text's relevance to your project (the annotation). Annotations are usually no longer than 300-500 words, and include such details as the text's main argument, the author's methodology, the connection or lack of connection to the argument you wish to make, any important details or quotes you wish to especially remember for your paper, and your opinion about the source.

Why MLA Style?

The Modern Language Association is the major scholarly organization for the study of modern languages and literatures. Scholars and editors take their cues concerning proper bibliography formatting from the standards published in the MLA reference guide. While other bibliographic styles exist in the humanities, most notably Chicago Style, MLA style is generally considered the default humanities format. Bibliographic styles can often seem draconian in their insistence on where commas, periods, and semicolons go in the reference. Please remember these rules for exactness are to help your reader verify your work. You wouldn't make a mistake in communicating a proof or equation in a lab report, please take the correct MLA format as seriously. That said, let me tell you a secret: none of your professors have MLA Style memorized. While the most common forms (books, journal articles) may now be second nature to them, they undoubtedly still keep a well-worn copy of the Style manual at hand to reference how to cite unusual texts. **If you are in doubt take that time to look up the correct citation style**.

The Undergraduate Writing Center in FAC 211 has several MLA Style Manuals that you can use at any time or you can make an appointment with a consultant to discuss proper bibliographic formatting.

OAS Science Inquiry: Independent Laboratory Investigation

Purpose: To create a quantitative data set in a controlled laboratory setting that is subjected to statistical analysis, optimization and modeling.

Background: The setting for your first inquiry experience was outside the formal laboratory in an environment that provided a lot of room for creative discovery, but fairly few tools for quantitative assessment of the data collected. Also in the first inquiry, the format for the write-up was left entirely to your personal taste, based upon what you have learned about how to present scientific information.

In this second assignment we move into the confines of a more formal laboratory setting. Your opportunities for discovery, are on the one hand, more constrained because you are to use only laboratory equipment provided in the BME lab. However your ability to collect data in a quantitative manner should greatly improve because of the availability of precision scientific equipment. In a nutshell, your second inquiry will probably not be as inventive as the first one, but you should be able to do a better job of evaluating your hypothesis.

Science Inquiry requirements: As you perform this second experiment, there will be three specific requirements placed on your write-up. These requirements for the write-up are listed below. If your write-up does not adhere to these requirements it will be returned for correction.

1. You must use the format for laboratory write-up that I provide below. Include each of the eight sections in the write-up, even if you are uncertain as to the specifics of material to be included.

2. Over the course of Dr. Laude's lectures he will discuss the various aspects of the experiment design and execution, statistical analysis, optimization and modeling, and presentation. The skills you should exhibit in Inquiry 2 are:

    - The acquisition of sufficient quantitative data to allow for inferential statistical test to be performed on the data. At this stage I am unconcerned as to the kind of test you use, but obvious choices might include the student t, F, $\chi 2$, Q or others.

    - An attempt to either optimize (find a maximum or minimum on a response surface) or model the data that you collect (generate a function that fits the data you collect.)

3. A critical discussion in the results section of what question you wanted to answer and how analysis of the quantitative information you generated (whether in the form or statistical analyses, optimization or modeling) told you the answer to your question. If you realize in hindsight that your experiment design was lacking, discuss what you might do differently to learn more about the question you posed.

OAS FALL 2011: GENERAL FORMAT FOR SCIENCE INQUIRY LABORATORY WRITE-UP

What can I say, scientists are boring--we figured out a way to write up a lab, and pretty much it is what we expect from everyone who is asked to write up a lab. Listed below is the standard approach with the usual hypothesis, experiment design, data, etc. If you choose to follow another structure that is fine but you should explain why your approach is better.

Recommended structure:

- A title
- A statement about what new thing you will learn.
- Background material including theory and models
- Experiment design
- Data
- Calculations including statistical treatment
- Results and error

Title: Provide a title that includes key words that will allow interested individuals to search and find you work.

New knowledge statement: Make a statement that indicates why you are doing the inquiry. Either tell me what new knowledge which be generated or if you want to write a hypothesis, make one that is predictive in nature.. If possible include an explanation of what results you intend to generate.

Background: Do some background work to develop a foundation for the experiments that you perform. Make sure you cite all sources. Use this information to develop a theoretical basis or predictive model to interpret the data. If possible, provide a mathematical framework for the model. For example, those of you using the spectrometer might make use of Beer's law. Those of you using a piece of physics equipment might use one of Newton's laws.

Experiment design: As discussed in Dr. Laude's lecture, where the things to consider in collecting laboratory data:

- When you collect data, you are measuring the response for a system.

- The response is a dependent variable that is a function of many independent variables called factors. This idea of factors causing a system response is commonly referred to as "cause and effect." The n-dimensional surface created by varying the factors is called a response surface.

- Pretty much all scientific inquiry revolves around the process of evaluating causes (factors) that produce responses (effects.) A first step in any experiment then is to make a good guess at the factors responsible for a response. In fact, many hypotheses have as their foundation, the description of a cause and effect.

- Even in the simplest experiments, there are large numbers of factors responsible for a response. These factors may be dependent or independent of each other in how they contribute to the response. For the novice, sensible experiment design requires that data be collected under conditions in which all factors except one are held constant. This use of a single variable will ensure that what is causing the response is the varied factor and not the controlled variables. It is probably asking enough in this inquiry if you limit your experiment to exploring a how a single factor affects the system response.

- As you write-up you experiment design section, some of the questions you should consider in putting together an experiment to collect quantitative data should consider the following questions:
  1. What is the response that you are investigating?
  2. What are the factors that produce the response?

3. What factors will you control?
4. What factors will you vary?
5. What kinds of control experiments will you run to make sure you're your controlled factors are indeed constant?
6. How much data will you acquire?
7. What are the boundaries to the data you acquire (lowest and highest values you use and what is the reason for setting these boundaries.)?
8. What resolution do you want in your data and what is the reason for choosing this resolution.
9. Is there significance to the order of data collection?
10. How many reproducible sets will you acquire to establish statistical significance?

Data: Make sure you record all of your data and experiences in your lab notebook. However, in the write-up present only your most useful data and do so in a well-organized fashion, either in tables or graphs. These data presentation should parallel in form your decisions concerning experiment design.

Calculations: Perform sample calculations where appropriate to generate the results necessary for evaluation of the hypothesis. This may require calculations based upon the model function assumed for the data. It might require that you generate an empirical model function that fits the data. It may require a statistical analysis to validate the data collected or assign a confidence level to a comparison of two data sets. Make sure you include your statistical analysis here.

Results: Discuss the success or failure of your hypothesis. Present any new knowledge gained. If you wrote a hypothesis, provide an explanation of whether it is rejected or supported. It is very likely that you regret the work you did for various reasons such as poor experiment design or substantial error in the data collection. If so, provide a discussion of improvements in experiment design or ways to reduce error that will make it possible to improve the work product. Recommendations for new experiments based upon the results should be presented.

References: Describe all sources that you used in developing the idea for the inquiry, performing the inquiry, and completing the write-up. The references should include thanks to the people who helped you and a listing of the written sources that you used in the style of a science journal you enjoy.

OAS Skill Module for Experimental Science: Sizing Up a Measuring Device

When you collect quantitative data, you either count or you measure. If you are fortunate you will use something to do the counting or the measuring other than your voice or the width of your fingers, which are nice in a pinch, but hardly the most precise or accurate devices out there. In fact, over time devices with which you gather quantitative data have become increasingly fast, accurate, precise, and if under computer control, capable of generating and storing large amounts of information.

Seasoned scientists have an intuitive feel for how to approach any new device they use to make measurements. They immediately develop a sense of the device's upper and lower limits of measurement, reproducibility, accuracy, sensitivity and dynamic range. Knowing this information quickly defines the range of possible experiments that can be performed with a device. For example, good scientists immediately know not to use a water thermometer to measure boiling points over $100^{o}C$ or know that a particular optical filter in a photometer needs to be removed because it is blocking the violet light.

Sadly, most unseasoned users of measuring devices can't be bother to figure out the utility of a device and instead launch immediately into measurements that are off scale or too insensitive or poorly resolved to answer the question original posed. And the result? Useless data and an inquiry returned with comments about knowing your measuring device.

Now it is my strong preference that you not generate useless data in your second inquiry, and consequently you are asked to consider the following questions BEFORE your begin your inquiry.

Assignment: Select a measuring device from the BME lab and explore its capabilities. Assess the device to determine answers to the bulleted questions below and then write a one page paper with an exciting title like:

"My Friend the Tape Measure" or "Photometers Light up my Life"

in which you discuss the capabilities and limitations of the measuring device. Ideally you will use this measuring device in your inquiry, but it is not requirement of the skill module. Do appreciate, though, that any device you use to make a measurement needs this consideration before you begin collecting real data.

- Name and type of instrument?
- What is measured?
- What are the units of measurement?
- What is the largest amount that can be measured?
- What is the smallest amount that can be measured.
- How many resolution elements are possible with the device?
- How sensitive it the device (the slope of the response that is measured?)
- What is the dynamic range of the device (the number of orders of magnitude of measurement?)
- Make 10 measurements with the device. What can you say about its precision?
- How accurate is the device? What is it that limits the accuracy?
- How fast can the device make a measurement?
- Is the device automated? If so, how much information can it acquire?
- What are the trade-offs in speed, accuracy and precision with the device?
- If you could change on thing about your device to make it better, what would it be?

Not all of these questions apply to every device. However many answers are only realized after you spend some time contemplating concepts like sensitivity or dynamic range in the context of the device you are using. Be thoughtful about your responses because understanding your measuring device will likely determine how successful your science inquiry will be.