ARIZONA STATE UNIVERSITY

GENERAL STUDIES COURSE PROPOSAL COVER FORM
(ONE COURSE PER FORM)


3.) COURSE PROPOSED: Prefix: ASM  Number: 265  Title: Lab Methods in Archaeology  Credits: 4

CROSS LISTED WITH: Prefix:  Number: ; Prefix:  Number: ; Prefix:  Number: ; Prefix:  Number: ; Prefix:  Number: ;

4.) COMMUNITY COLLEGE INITIATOR: SHEREEN LERNER, PH.D.  PHONE: 480-461-7306  FAX: 480-461-7812

ELIGIBILITY: Courses must have a current Course Equivalency Guide (CEG) evaluation. Courses evaluated as NT (non-transferable are not eligible for the General Studies Program.

MANDATORY REVIEW:

☐ The above specified course is undergoing Mandatory Review for the following Core or Awareness Area (only one area is permitted; if a course meets more than one Core or Awareness Area, please submit a separate Mandatory Review Cover Form for each Area).

POLICY: The General Studies Council (GSC-T) Policies and Procedures requires the review of previously approved community college courses every five years, to verify that they continue to meet the requirements of Core or Awareness Areas already assigned to these courses. This review is also necessary as the General Studies program evolves.

AREA(S) PROPOSED COURSE WILL SERVE: A course may be proposed for more than one core or awareness area. Although a course may satisfy a core area requirement and an awareness area requirement concurrently, a course may not be used to satisfy requirements in two core or awareness areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirements and the major program of study.

5.) PLEASE SELECT EITHER A CORE AREA OR AN AWARENESS AREA:
Core Areas: Natural Sciences (SG)  Awareness Areas: Select awareness area...

6.) On a separate sheet, please provide a description of how the course meets the specific criteria in the area for which the course is being proposed.

7.) DOCUMENTATION REQUIRED
☒ Course Description
☒ Course Syllabus
☒ Criteria Checklist for the area
☒ Table of Contents from the textbook required and/or list of required readings/books
☒ Description of how course meets criteria as stated in item 6.

8.) THIS COURSE CURRENTLY TRANSFERS TO ASU AS:
☒ DECASMPrefix
☐ Elective

Correct CEG listing: ASU's ASM 365

Current General Studies designation(s):

Effective date: 2011 Fall  Course Equivalency Guide

Is this a multi-section course? ☒ yes  ☐ no
Is it governed by a common syllabus? ☒ yes  ☐ no

Chair/Director: SHEREEN LERNER  Chair/Director Signature: Email sent to Jeff Ricker

AGSC Action:  Date action taken:  ☐ Approved  ☐ Disapproved

Effective Date:

Note: ASU’s equivalency will be lost in Fall 2011. The removal of SG designation is in process.
Proposer: Please complete the following section and attach appropriate documentation.

**ASU-[SG] CRITERIA**

I. - FOR ALL GENERAL [SG] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:

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<td>1. Course emphasizes the mastery of basic scientific principles and concepts.</td>
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<td>2. Addresses knowledge of scientific method.</td>
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<td>3. Includes coverage of the methods of scientific inquiry that characterize the particular discipline.</td>
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<td>4. Addresses potential for uncertainty in scientific inquiry.</td>
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<td>5. Illustrates the usefulness of mathematics in scientific description and reasoning.</td>
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<td>6. Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.</td>
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<td>7. Students submit written reports of laboratory experiments for constructive evaluation by the instructor.</td>
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<td>8. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.</td>
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II. - AT LEAST ONE OF THE ADDITIONAL CRITERIA THAT MUST BE MET WITHIN THE CONTEXT OF THE COURSE:

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<td>A. Stresses understanding of the nature of basic scientific issues.</td>
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<td>B. Develops appreciation of the scope and reality of limitations in scientific capabilities.</td>
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<td>C. Discusses costs (time, human, financial) and risks of scientific inquiry.</td>
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<td>ASM</td>
<td>265</td>
<td>Laboratory Methods in Archaeology</td>
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Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

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ASM 265 Proposal for SG

1. For all general (SG) natural sciences core area courses, the following are critical criteria and must be met:

1. **Course emphasizes the mastery of basic scientific principles and concepts:**
   a. How course meets spirit:
   Students will be introduced to the science of archaeology and will gain an understanding of basic theory, methods and techniques of archaeological laboratory processing and analysis. The course emphasizes the entire process of analysis, from problem definition, to analytical techniques, quantitative methods, hypothesis testing and report preparation.

   b. Course competencies met:
   1. Review the purpose for laboratory analysis.
   2. Define the basic principles behind analysis.
   3. Critique the methods for statistical analysis of artifacts.

   c. Detailed evidence of how course meets criteria:

   Syllabus:
   1. The scientific method, hypothesis, test implications, theory
   2. Experimental studies, ethnoarchaeology and "middle range theory."
   3. Attributes, attribute states and typological systems.

   Text:
   All chapters covered in the syllabus involve the coverage of knowledge gained from archaeological artifact analysis.
   Chapter 1-Introduction; The archaeological record; site formation processes
   Chapter 2-The Archaeological Project; Research Design

2. **Addresses knowledge of scientific method. (see below #3)**

3. **Includes coverage of the methods of scientific inquiry that characterize the particular discipline.**
   a. How course meets spirit:
   Students will be provided with a framework for understanding the scientific method and the purposes and principles behind laboratory analysis. Basic instruction is provided in common categories of archaeological analysis. Students are taught different techniques, specific research questions, problems, and analytic goals pertaining to archaeological data.

   b. Course competencies met:
   1. Review the purpose for laboratory analysis.
   2. Define the basic principles behind analysis.
   3. Critique the methods for statistical analysis of artifacts.
4. Explain ways to analyze ceramic artifacts
5. Describe the elements of analysis of chipped stone artifacts
6. Trace the needs for specialized artifact analysis.
7. Examine the basis for analysis of historic artifacts.

c. Detailed evidence of how course meets criteria:
Syllabus:
1. The scientific method, hypothesis, test implications, theory
2. Experimental studies, ethnoarchaeology and "middle range theory."

Powerpoint: (see attached)

B. Detailed evidence of how course meets criteria:

Text:
Chapter 4: Analysis of Flaked Stone Artifacts
Chapter 5: Analyses of Ground Stone Milling and Processing Implements, Decorative and Ritual Objects, Cutting, and Abrading Tools
Chapter 6: Analysis of Aboriginal Ceramics
Chapter 7: Analysis of Shell and Bone Artifacts
Chapter 8: Analysis of Perishables
Chapter 9: Analysis of Historical Artifacts
Chapter 10: Analysis of Animal Remains
Chapter 11: Analysis of Plant Remains
Chapter 12: Analysis of Human Remains

4. Addresses potential for uncertainty in scientific inquiry.
A. How course meets spirit: Experimental archaeology employs a number of different methods, techniques, analyses, and approaches in order to generate and test hypotheses, based upon archaeological source material, such as artifacts or ecofacts.

Course competencies met:
1. Critique the methods for statistical analysis of artifacts.

B. Detailed evidence of how course meets criteria: syllabus and textbook:

Syllabus:
1. Experimental studies, ethnoarchaeology, and "middle range theory."
2. Statistical methods for analysis

5. Illustrates the usefulness of mathematics in scientific description and reasoning.
A. How course meets spirit: This course pulls together the common threads of archaeological analytical concepts. The purpose is to examine how archaeological data are formed and recorded, how they are classified or grouped together for
analysis, and some relatively simple but important ways these data can be manipulated, compared, examined, or presented to extract information from them. The course familiarizes students with a wide range of analytical techniques.

**Course competencies met:**
1. Critique the methods for statistical analysis of artifacts.

**B. Detailed evidence of how course meets criteria:**

**Syllabus:**
**UNIT 2: Statistical methods for analysis**
1. Basic descriptive statistics
2. Introduction to hypothesis testing
3. Nonparametric statistics (nominal and ordinal scaled data)
4. Correlation

**Lab:** General measuring exercises: Students are given a range of measuring tools including standard calipers of different styles (vernier scale, dial, inside calipers), spreading calipers, and a measuring or osteometric board. They are also given several different artifacts to measure.

**Lab:** Sediment grain size analysis: Both sieve analysis and hydrometer methods are taught. A sample is dry screened and another is wet screened. The course fractions are weighted and percentages are calculated for course sands, medium sands, fine sands and the fine fraction. The hydrometer method of calculating the grain size for the fine fraction is demonstrated and the whole class participates. We mix a weighed sample of sediment with a defloculant and use a hydrometer to measure the specific weight of the solution at the prescribed intervals. Using Stoke’s law we calculate the amounts and breakdowns of silts and clays.

6. **Includes weekly laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.**
**A. How course meets spirit:** The purpose of the course is to introduce student to basic laboratory and analytical techniques in archaeology. The course will introduce the student to classification and analysis of archaeological materials. Classification is a fundamental aspect of archaeological inquiry. Each student will design and complete a laboratory analysis project in their area of interest. The project will conclude with a written report of the analysis and will constitute a major portion of the grade.

**List of Labs: [see attached]**

**B. Detailed evidence of how course meets criteria: syllabus and textbook:**

**Syllabus:**
UNIT 3: CERAMIC ANALYSIS
1. Major research issues: chronology, technology, vessel function, group identity, trade and interaction.
2. Basic technology: ceramic attributes and attribute states.
3. Experimental approaches to the analysis of prehistoric ceramic technology.
4. Approaches to design element analysis.
5. Source Analysis.

UNIT 4: LITHIC ANALYSIS
   a. Basic technology and attributes.
   b. Use-wear analysis.
   c. Studying reduction sequences.
2. Groundstone.
   a. Basic technology.

UNIT 5: SPECIALIZED ANALYSIS
1. Shell artifact analysis.
2. Soil analysis.
3. Flotation Analysis.
4. Pollen Analysis.
5. Faunal Analysis.

UNIT 6: Report writing
1. Technical writing
2. Report formats
3. Use of tables and figures

Text:
Chapter 4: Analysis of Flaked Stone Artifacts
Chapter 5: Analyses of Ground Stone Milling and Processing Implements, Decorative and Ritual Objects, Cutting, and Abrading Tools
Chapter 6: Analysis of Aboriginal Ceramics
Chapter 7: Analysis of Shell and Bone Artifacts
Chapter 8: Analysis of Perishables
Chapter 9: Analysis of Historical Artifacts
Chapter 10: Analysis of Animal Remains
Chapter 11: Analysis of Plant Remains
Chapter 12: Analysis of Human Remains
Chapter 13: Archaeometry and Special Analyses

7. **Students submit written reports of laboratory experiments for constructive evaluation by the instructor.**

A. How course meets spirit: Students are expected to participate in shared classroom experiments demonstrating aspects of the analysis and a set of experiments. This will provide the student with a range of experiences that can be drawn upon in the development of their class project.
Course competencies met:
1. Integrate analysis with report preparation

B. Detailed evidence of how course meets criteria: syllabus and textbook:

Syllabus:
UNIT 6: Report writing
   1. Technical writing
   2. Report formats
   3. Use of tables and figures
   4. Use of artifact illustrations

Text:
Chapter 2: The Archaeological Project
Chapter 14: Archaeological Illustration
Appendix 1: A Sample Excavation Report

Lab Information:
Student Projects: Each student formulates their own research question and then
determines the type of material and analytical procedures to address those
questions. They are given the type of collection required for the project and they do
the analysis. They typically use descriptive statistics, but on occasion also use more
analytical statistical or quantitative methods. They receive a good deal of instructor
interaction and guidance on the projects.

8. Course is general or introductory in nature, ordinarily at lower-division level;
not a course with great depth of specificity.
A. How course meets spirit: All course competencies are addressed in lecture, and
discussed in the text (Archaeological Laboratory Methods: An Introduction, 3rd
dition) in general terms that are intended to provide students with an introduction
to archaeological laboratory techniques. After completing the course, students will
have an understanding of basic archaeological research techniques, including
methods of report writing.

Course competencies met
1. Review the purposes for laboratory analysis.
2. Define the basic principles behind analysis.
3. Examine primary steps for handling artifacts.
4. Explain ways to analyze ceramic artifacts.
5. Describe the elements of analysis of chipped stone artifacts.
6. Trace the needs for specialized artifact analysis.
7. Examine the basis for analysis of historic artifacts.
8. Critique the methods for statistical analysis of artifacts.
B. Detailed evidence of how course meets criteria: syllabus and textbook:

Chapters:
Chapter 1-Introduction; The archaeological record; site formation processes
Chapter 2-The Archaeological Project; Research Design
Chapter 3-The Archaeological Catalog
Chapter 4: Analysis of Flaked Stone Artifacts
Chapter 5: Analyses of Ground Stone Milling and Processing Implements, Decorative and Ritual Objects, Cutting, and Abrading Tools
Chapter 6: Analysis of Aboriginal Ceramics
Chapter 7: Analysis of Shell and Bone Artifacts
Chapter 8: Analysis of Perishables
Chapter 9: Analysis of Historical Artifacts
Chapter 10: Analysis of Animal Remains
Chapter 11: Analysis of Plant Remains
Chapter 12: Analysis of Human Remains
Chapter 13: Archaeometry and Special Analyses
Chapter 14: Archaeological Illustration
Chapter 15: Setting up the Basic Archaeology Laboratory

II. Additional criteria that must be met within the context of the course.
A. Stresses understanding of the nature of basic scientific issues.
   a. How course meets spirit:
      Students are taught course competencies 1-9. This lab methods course will introduce the student to classification and analysis of archaeological materials. Classification is a fundamental aspect of archaeological inquiry. Classifications are best viewed not as self-evident and intuitive devices, but as archaeological constructs designed to help identify and explain temporal and spatial patterning in the archaeological record. Any archaeological phenomenon (site, feature, modified and unmodified object) can be classified in a multitude of ways and measured at some scale. Student will learn that decisions about which attributes to measure and approaches to classification depend on the researcher’s theoretical perspective, the specific research question, as well as the facilities and expertise of the analyst.

      This class will examine various approaches to classification, particularly related to technology, function, and style. Understanding these materials in archaeological contexts assists in providing numerous interpretations of mobility and land use patterns, subsistence, and regional interaction and trade, just to name a few examples.

   Course competencies met:
   1. Review the purposes for laboratory analysis.
   2. Define the basic principles behind analysis.
   3. Examine primary steps for handling artifacts.
   4. Explain ways to analyze ceramic artifacts.
   5. Describe the elements of analysis of chipped stone artifacts.
6. Trace the needs for specialized artifact analysis.
7. Examine the basis for analysis of historic artifacts.
8. Critique the methods for statistical analysis of artifacts.

Evidence in syllabus:
UNIT 1: INTRODUCTION
1. Introduction to course.
2. The scientific method, hypothesis, test implications, theory
3. Experimental studies, ethnoarchaeology and "middle range theory."
4. Attributes, attribute states and typological systems.
5. Cataloging systems and artifact processing.
   a. Inventory and cataloging
   b. Standard artifact processing
   c. Special artifact processing
6. Laboratory safety issues and procedures.
7. Basic tools, measurements and techniques.
8. Critique the methods for statistical analysis of artifacts.
9. Laboratory photography.
10. Illustration techniques.
UNIT 2: Statistical methods for analysis
1. Basic descriptive statistics
2. Introduction to hypothesis testing
3. Nonparametric statistics (nominal and ordinal scaled data)
4. Correlation
UNIT 3: CERAMIC ANALYSIS
7. Major research issues: chronology, technology, vessel function, group identity, trade and interaction.
8. Basic technology: ceramic attributes and attribute states.
9. Experimental approaches to the analysis of prehistoric ceramic technology.
10. Approaches to design element analysis.
11. Source Analysis.
UNIT 4: LITHIC ANALYSIS
   a. Basic technology and attributes.
   b. Use-wear analysis.
   c. Studying reduction sequences.
   a. Basic technology.
UNIT 5: SPECIALIZED ANALYSIS
7. Soil analysis.
8. Flotation Analysis.
COURSE DESCRIPTION

ASM 265: LABORATORY METHODS IN ARCHAEOLOGY

This course provides students with a framework for understanding the scientific method and the purposes and principles behind laboratory analysis. A primary goal of this course is to provide the student with an understanding of the basic theory, methods and techniques of archaeological laboratory processing and analysis. The course emphasizes the entire process of analysis, from problem definition, to analytical techniques, quantitative methods, hypothesis testing and report preparation. Basic instruction is provided in common categories of archaeological analysis including ceramic, lithic, soil, and shell artifacts. Each student will design and complete a laboratory analysis project in their area of interest. The project will conclude with a written report of the analysis and will constitute a major portion of the grade. The use of computerized databases and basic quantitative analysis will be covered.
Official Course Description: MCCCD Approval: 04/25/06

ASM265 20066-99999
L+L 4 Credit(s) 4 Period(s)

Laboratory Methods in Archaeology

Techniques of artifact. Basic archaeological research techniques; methods of report writing. Prerequisites: None.

Course Note: ASM265 may be repeated for a total of eight (8) credits hours.

MCCCD Official Course Competencies:

ASM265 Laboratory Methods in Archaeology
20066-99999

1. Review the purposes for laboratory analysis. (I)
2. Define the basic principles behind analysis. (I)
3. Examine primary steps for handling artifacts. (II)
4. Explain ways to analyze ceramic artifacts. (III)
5. Describe the elements of analysis of chipped stone artifacts. (IV)
6. Trace the needs for specialized artifact analysis. (V)
7. Examine the basis for analysis of historic artifacts. (VI)
8. Critique the methods for statistical analysis of artifacts. (VII)
9. Integrate analysis with report preparation. (VIII)

MCCCD Official Course Outline:

ASM265 Laboratory Methods in Archaeology
20066-99999

I. Framework for analysis of material culture
   A. Design of analysis-purposes & principles
   B. Description through attribute recording
   C. Classification and typology
II. Laboratory handling and processing
   A. Inventory and cataloging
B. Standard artifact processing
C. Special artifact processing

III. Ceramic artifact analysis
   A. Attribute definition
   B. Ceramic design analysis
   C. Typologies
   D. Specialized analysis

IV. Chipped stone analysis
   A. Attribute definition
   B. Use and war analysis
   C. Specialized analysis

V. Specialized artifact analysis
   A. Shell
   B. Ground Stone
   C. Selected artifact categories

VI. Historic Artifact Analysis
   A. Classification
   B. Dating

VII. Statistical methods for analysis
   A. Basic descriptive statistics
   B. Introduction to hypothesis testing
   C. Nonparametric statistics (nominal and ordinal scaled data)
   D. Correlation

VIII. Report writing
   A. Technical writing
   B. Report formats
   C. Use of tables and figures
   D. Use of artifact illustrations
10. Faunal Analysis.
UNIT 6: Report writing
   4. Technical writing
   5. Report formats
   6. Use of tables and figures
Use of artifact illustrations

MESA COMMUNITY COLLEGE

ASM 265: LABORATORY METHODS IN ARCHAEOLOGY

INSTRUCTOR: Dr. Jerry B. Howard
OFFICE HOURS: Before class/by appointment
PHONE: 480 644-3428 (office, Mesa Southwest Museum)
        480 286-3211 (cell)
EMAIL: jbrhoward@aol.com, jerry.howard@cityofmeas.org

COURSE DESCRIPTION:

The goal of this course is to provide the student with an understanding of the basic theory, methods and techniques of archaeological laboratory processing and analysis. The course emphasizes the entire process of analysis, from problem definition, to analytical techniques, quantitative methods, hypothesis testing and report preparation. Basic instruction is provided in common categories of archaeological analysis including ceramic, lithic, soil, and shell artifacts. Each student is expected to design and carry out a laboratory analysis project in their area of interest. The project will conclude with a written report of the analysis and will constitute a major portion of the grade. The use of computerized data bases and basic quantitative analysis will be covered.

Class periods will be divided into three sections; a lecture covering a specific aspect of archaeological analysis, a shared classroom experiment demonstrating aspects of the analysis and a set of experiments to be conducted by the student. This will provide the student with a range of experiences that can be drawn upon in the development of their class project. As the semester progresses, the focus will shift from an introduction to the various forms of analysis to working on student projects. Portions of class time will be used to work on student analysis projects. Access to the laboratory during hours outside of the formal class time will also be scheduled. The course schedule is tentative and changes can be made to accommodate the interests and needs of the class.
Course Competencies

1. Review the purposes for laboratory analysis.
2. Define the basic principles behind analysis.
3. Examine primary steps for handling artifacts.
4. Explain ways to analyze ceramic artifacts.
5. Describe the elements of analysis of chipped stone artifacts.
6. Trace the needs for specialized artifact analysis.
7. Examine the basis for analysis of historic artifacts.
8. Critique the methods for statistical analysis of artifacts.

COURSE OUTLINE:

UNIT 1: INTRODUCTION

4. Introduction to course.
5. The scientific method, hypothesis, test implications, theory
6. Experimental studies, ethnoarchaeology and "middle range theory."
7. Attributes, attribute states and typological systems.
8. Cataloging systems and artifact processing.
   a. Inventory and cataloging
   b. Standard artifact processing
   c. Special artifact processing
9. Laboratory safety issues and procedures.
10. Basic tools, measurements and techniques.
11. Critique the methods for statistical analysis of artifacts.
12. Laboratory photography.
13. Illustration techniques.

UNIT 2: Statistical methods for analysis

5. Basic descriptive statistics
6. Introduction to hypothesis testing
7. Nonparametric statistics (nominal and ordinal scaled data)
8. Correlation

UNIT 3: CERAMIC ANALYSIS

13. Major research issues: chronology, technology, vessel function, group identity, trade and interaction.
15. Experimental approaches to the analysis of prehistoric ceramic technology.
16. Approaches to design element analysis.
17. Source Analysis.
18. Basic typology; identification of Hohokam ceramics.

UNIT 4: LITHIC ANALYSIS

5. Chipped Stone.
   a. Basic technology and attributes.
   b. Use-wear analysis.
   c. Studying reduction sequences.

   a. Basic technology.

UNIT 5: SPECIALIZED ANALYSIS

11. Shell artifact analysis.
12. Soil analysis.
13. Flotation Analysis.
15. Faunal Analysis.

UNIT 6: Report writing

5. Technical writing
6. Report formats
7. Use of tables and figures
8. Use of artifact illustrations

GRADING

Course grading will be based on four projects:

Project 1: Project Proposal, 10% of grade (20 points)

Each student will prepare a one-to-two page, double-spaced, proposal for the semester project. The proposal will identify the category of analysis to be conducted (e.g. ceramic analysis, lithic analysis, shell analysis, etc.) and identify the study collection to be used (identify the site where the collection originates, nature of the collection and size of the collection). Project material from the Arizona Museum of Natural History excavations, Mesa Community College excavations will be made available. Outside collections may also be used, following review and approval by the instructor. The research goals, problem orientation, attributes to be identified and analytical techniques to be used must be identified. The proposal is a learning tool, one that should help organize and orchestrate the student’s class project.
Project 2: Laboratory Journal, 20% of grade (20 points)

Each student will keep a journal, recording the work accomplished during classroom experiments. The journals will be reviewed and graded for comprehensive recording, organization, neatness and for the students ability to make careful observations.

Project 3: Presentation of results, 10% of grade (10 points)

Each student will present a summary of their research and results to the class. Presentations should be concise, lasting approximately 15 to 20 minutes.

Project 4: Analysis project and paper, 60% of grade (60 points).

The paper should be logically organized and clearly written. It should include:

1. The problem orientation (what you wish to learn).
2. The research design (identify how the empirical data will provide information to solve the problem).
3. A description of the attributes and attribute states used in the analysis.
4. The analysis sheets (the data).
5. Appropriate quantitative summaries of the data.
6. Conclusions, what was supported (or not supported) by the data.

Each area will be evaluated at approximately 10 points.

Attendance Policy: The final paper in this class is developed by the student based on the information presented in lectures and activities. To do well in the class you MUST attend class, listen, participate in class discussions and activities, and take useful notes. I will take roll or have a sign-up sheet will be available at the beginning of each class period. If you cannot avoid missing a class, give me a call prior to class. If I do not hear from you, your absence will be recorded as "unaccounted". Also, due to security issues at the museum, the door leading down to the lab must be locked and will not be attended after class starts. If you are late and locked out you can knock loudly on the door. Alternatively, if you have a cell phone you can call the lab phone at 480 644-3428. If you miss more than 3 classes of unaccounted classroom instruction, you may be withdrawn from the course. If you have a pattern of missing classes, even though your absences are "accounted for", you may also be withdrawn from the class. I prefer not to withdraw anyone so please let me know if there are problems so we can try to resolve them.
MISCELLANEOUS ITEMS

Disabilities: I will make any reasonable accommodations for limitations due to disabilities, including learning disabilities. Please see me personally before or after class or during my office hours to discuss any special needs you might have. If you have a documented disability and require specific accommodations, you will need to contact the Disability Resources and Services Office at 461-7447, in Building 37, Student Services Complex, to obtain an "Instructor Notification Form."

Honesty: Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper without giving credit to the source of that information or wording; it is also not acceptable. If you are found to be cheating, your essay or assignment will be taken away from you and you will receive no points. You may be subject to disciplinary action, per MCC catalog policy.

Laboratory Safety: The laboratory does contain a limited number of chemicals that could cause reactions or be harmful in other ways. Use care when handling chemicals and equipment. Use safety equipment, such as eye protection, when appropriate. Please notify the instructor immediately if there is a spill or health related problem. A City of Mesa fire department, staffed with EMTs is located just down the street from the museum.
ASM 265 LAB EXERCISES

The basic activities of this class are divided into lectures, experiments and exercises

1. Experiment: how to clean various types of artifacts.

2. Exercise: class prepares a mild acid bath to remove calcium carbonate deposits from ceramics.

3. Exercise: class uses an ultrasonic cleaner to clean appropriate types of artifacts.

4. Labeling exercise: students are taken through three different processes of labeling artifacts.

5. General measuring exercises: Students are given a range of measuring tools including standard calipers of different styles (vernier scale, dial, inside calipers), spreading calipers, and a measuring or osteometric board. They are also given several different artifacts to measure.

6. Munsell Color Chart exercise: Students are given a series of ceramic sherds and a Munsell Color Chart and asked to identify colors.

7. Attributes Experiment: Students area given a mixed group of prehistoric ceramics having several sherds of each of several different ceramic types. They are instructed to select attributes (color, paint treatment, surface treatment) that they then use in a typological exercise. They write, in their laboratory notebook, which attributes they selected, what types resulted from this and how well they feel their attributes reflected the types present.

8. Battleship curve experiment: students are given the percentages of different types of ceramics for multiple time periods. They are then led through the process of constructing a battleship curve showing ceramic change through time.

9. Photography and graphics exercises: Photo equipment, including digital cameras, macroscopic equipment (diopters and a bellows) and copy stands, is set up. The students have an opportunity to operate the equipment and take standard and macroscopic photos. Issues such as depth of field and parallax are explored. Techniques for drawing artifacts are also explored.

10. Standard Measurements for ceramics: Use of the bowl rim diameter chart, volume measurement by filling the vessel with a filler and then pouring it into a graduated cylinder and taking the measurement. Jar and bowl diameters, height, rim diameter, and neck length (or height) measurement.
11. Ceramic re-firing experiment: students, in pairs, select an unprovenienced sherd and break it in half, one half being the control and the other being the experimental sherd. The hardness (mohs scale) is determined and the color is recorded using the Munsell color chart. The sherds are heated in a lab furnace to 600 degrees C. The hardness and color are checked at each stage. The sherds are heated to higher temperatures, going up 100 degrees C. until 900 C. is reached. When the original firing temperature is reached, the hardness and color shifts. The paint on the ceramic is also monitored to determine if it is a mineral or organic based paint.

12. Ceramic typing exercise: With one-on-one help, the students are given a bag of sherds from one of our excavations. They sort the sherds by types, ceramic form and portion of a vessel. This is the standard typological breakdown done in our laboratory.

13. Ceramic temper sourcing: Using a binocular microscope, the students compare sherds from the excavations with temper type material. The temper cross-reference collection was provided by David Abbott and it follows his procedures.

14. Lithics: Students are given the opportunity to try flint knapping. A demonstration is provided and then, using safety gear, the students can try to remove a flake from a core and they can try pressure flaking.

15. Lithics, measurements: Standard measurements are taken on a variety of lithic materials.

16. Lithic typology: Using bags of lithics from the excavations, students do a standard typological sort. They sort by ground stone, chipped stone, flake type (primary, secondary, tertiary), cores, debitage, and formal tool types. Wear patterns are also identified, described and recorded.

17. Sediment grain size analysis: Both sieve analysis and hydrometer methods are taught. A sample is dry screened and another is wet screened. The course fractions are weighted and percentages are calculated for course sands, medium sands, fine sands and the fine fraction. The hydrometer method of calculating the grain size for the fine fraction is demonstrated and the whole class participates. We mix a weighed sample of sediment with a deflocculant and use a hydrometer to measure the specific weight of the solution at the prescribed intervals. Using Stoke's law we calculate the amounts and breakdowns of silts and clays.

18. Shell analysis: Using a cross-reference collection students determine the genus and species (where possible) of the shells used to manufacture Hohokam shell jewelry.
19. Student Projects: Each student also formulates their own research question and then determines the type of material and analytical procedures to address those questions. They are given the type of collection required for the project and they do the analysis. They typically use descriptive statistics, but on occasion also use more analytical statistical or quantitative methods. They receive a good deal of instructor interaction and guidance on the projects.
Lab Exercises for ASM 265

The basic activities of this class are divided into lectures, experiments and exercises

1. Experiment: how to clean various types of artifacts.

2. Exercise: class prepares a mild acid bath to remove calcium carbonate deposits from ceramics.

3. Exercise: class uses an ultrasonic cleaner to clean appropriate types of artifacts.

4. Labeling exercise: students are taken through three different processes of labeling artifacts.

5. General measuring exercises: Students are given a range of measuring tools including standard calipers of different styles (vernier scale, dial, inside calipers), spreading calipers, and a measuring or osteometric board. They are also given several different artifacts to measure.

6. Munsell Color Chart exercise: Students are given a series of ceramic sherds and a Munsell Color Chart and asked to identify colors.

7. Attributes Experiment: Students area given a mixed group of prehistoric ceramics having several sherds of each of several different ceramic types. They are instructed to select attributes (color, paint treatment, surface treatment) that they then use in a typological exercise. They write, in their laboratory notebook, which attributes they selected, what types resulted from this and how well they feel their attributes reflected the types present.

8. Battleship curve experiment: students are given the percentages of different types of ceramics for multiple time periods. They are then led through the process of constructing a battleship curve showing ceramic change through time.

9. Photography and graphics exercises: Photo equipment, including digital cameras, macroscopic equipment (diopters and a bellows) and copy stands, is set up. The students have an opportunity to operate the equipment and take standard and macroscopic photos. Issues such as depth of field and parallax are explored. Techniques for drawing artifacts are also explored.

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The most important aspect of doing good archaeology is doing good science:

- Formulating questions and ways in which they can be tested using the scientific method.
- Using logical and valid arguments.
- Outlining explicit research designs.
The “New Archaeology” of the 60s

- Called for an explicitly scientific approach.
- Lewis Binford:
  - archaeology is anthropology or it is nothing.”
  - Could have said, archaeology is science or it is nothing.
- Need for hypothesis testing approach.
- Promoted the extensive use of advanced statistics to characterize and understand what we see in the archaeological record.
Search for behavioral laws or law-like statements

- Science is the search for the universal in nature using the established scientific method of inquiry.
- It is a search for universal laws of nature.
- Watson, Redman and LaBlanc 1971: *Explanation in Archaeology: An explicitly scientific approach.*
- In archaeology, scientific objective should be for behavioral laws, for example; what factors are responsible for settlement location?
In archaeology, these laws should be timeless and occur across both time and space.

Sahlins and Service: The Law of Evolutionary Potential – states that the more specialized and highly adapted a form in a given evolutionary stage, the smaller its potential for evolving to the next stage.

Results: SARG, not too impressive.

Findings too deterministic or rigid and doomed to failure given the diversity of human societies.

Turned to more probabilistic determinations using statistical approaches: what is most likely?
Three basic components in the process of scientific archaeology:

1. Establish an hypothesis.

2. Determine the test implications of the hypothesis.

3. Test the implications using new data and observations.
Definitions:

- **Hypothesis**: Any unconfirmed but testable proposition.

- **Test Implications**: Test implications follow logically from a hypothesis and are used to test the hypothesis to see if it can be disproven.
  - The test implications must be true if the hypothesis itself is true.
  - The reverse is not necessarily true; if the test implication is true, the hypothesis is not necessarily true.
  - They can only show that the hypothesis is not proven to be false.
Example 1:

- Hypothesis: All Hohokam pithouses are round.
- Test implication: All Hohokam houses ever excavated are round.
  - The hypothesis can only be true if all houses found are round.
  - However, the reverse is not necessarily true: If all houses found are round it does not mean that all unexcavated houses are round – there may be a square one out there we have not yet found.
Example 2:

- Hypothesis: The ancient city was abandoned after invading troops burned it to the ground.

- Test Implications:
  1. The walls, floors and collapsed roofs of the buildings should show signs of destruction by fire.
  2. Artifacts should be found on the floors of the structures, left where they had been in use at the time of the fire.
  3. None of the rooms should post-date the time of the fire.
Results:

- Excavations were conducted in the rooms showed evidence of burning and in-situ artifact assemblages were found. No rooms post-dated the fire.
- The test implications were consistent with the hypothesis of an invasion. We cannot disprove the hypothesis of invasion.
- However, we have not proven that it is an absolute truth: the fire may have been accidental, the result of a fire that got out of hand.
Definition: Theory

- In Science, a theory is an hypothesis that has been rigorously tested many, many times and it has not been proven false.
- A theory is the best proven explanations in science.
- The Theory of Evolution is a good (yet popularly controversial) example.
The Development of an Hypothesis: Inductive vs Deductive Arguments

How do we formulate an hypothesis for testing?

ARGUMENT BY ANALOGY: We often use ethnographic analogs.

We use known cases to predict unknown cases.

We look at an ethnographic case to predict prehistoric behavior.
Examples:

- Modern Pueblo groups use a flat stone slab to grind corn on. Similar items in prehistoric sites were also used this way.

- The Pima used brush weirs to block water coming down the river and direct it into their canals. Therefore, the Hohokam probably used similar weirs.
THE RESULTS OF THE USE OF ETHNOGRAPHIC ANALOGY IS THE FORMULATION OF HYPOTHESIS FOR TESTING. THEY ARE NOT A FINAL ANSWER!

An Hypothesis is unconfirmed but testable.
Inductive Arguments:

- Arguments where the conclusions contain more information than the premises.

- The premises are facts in an inductive argument.

- The conclusion is a prediction of the properties of an unknown case.
EXAMPLE:

P1: Hearths are placed in front of pithouse doors.
P2: Smoke from hearths must be vented out of the house.
P3: The rising smoke would go up and draw in air from the doorway.

Therefore: A smoke hole was located in the roof of the pithouse just inside the entryway.

This inductive argument accounts for the known facts, but the conclusion is not necessarily true. It can be a hypothesis for testing, but how?
In a deductive argument: IF the premises are true, then the conclusions MUST necessarily be true. It's elementary my dear Watson.

They take the form of IF … THEN arguments, if one thing is true, then the other must be true.

Deductive arguments work from the general to the particular.
EXAMPLE

P1: Genetic Marker 432, found on chromosome 56, is only found in the Mammoth.

P2: The fragment of bone on this pithouse floor has genetic marker 432 on chromosome 56.

Therefore: the bone came from a mammoth.
Now, what if we further state that the Hohokam in the house were eating mammoth? Is that a valid deductive argument?
NO!

It goes well beyond the original premises to link the bone to the Hohokam eating meat attached to the bone. They could have (logically any way):

- Killed the mammoth but not eaten the meat.
- Found a dead mammoth and kept the bone.
- Found the bone in a fossil deposit and kept it.
The Principle of Multiple Lines of Evidence

- A principle, used in archaeology, to secure multiple lines of evidence to test a proposition.
- Each line of evidence should rely on a different, unrelated, technique.
- Example: Dating a canal feature
  - Date the ceramics in the canal fill (depositional, artifactual)
  - Date the canal using C14 dating (radioactive decay)
  - Date the sediments using OSL dating (luminescent energy)
  - Establish chronological relationships through stratigraphic relationships. (depositional, geological processes)
Middle Range Theory:

- HOW DO WE GO FROM HYPOTHESIS TO PROOFS?
- We can use “Middle Range Theory,” use “bridging arguments” between hypothesis and proof. Study specific situations for information.
- To interpret relic glacial features we need to study what glaciers are today and how they behave.
- To understand dinosaur locomotion from bones we need to study the skeletal anatomy of modern species.
Schools of Study Used as Middle Range Theory in Archaeology

- Principles of Formation Processes.
- Ethnoarchaeology
- Experimental Archaeology
Formation Processes

- Developed by Michael Schiffer, University of Arizona as “Behavioral Archaeology.”

- States that: Archaeological site today are not pristine time capsules showing how things were in the past (the Pompey Premise).

- Instead, they are collections of artifacts and features that have undergone changes through human occupation and natural processes of erosion.

- Studies of formation processes shows how a site became what it is today.
Ethnoarchaeology

- The study of existing, non-industrialized societies to understand what happened in the past.
- Ethnographers (Cultural Anthropologists) study these groups but often do not ask questions or collect data useful to archaeologists.
- Archaeologists use these groups as analogs for what happened in the past.
Experimental Archaeology

- The replication and use of past technologies to understand how tools and features were made, used and how use modified them.
- Flint knapping today: archaeologists learned to make stone tools to understand the techniques used and the material left behind in the archaeological record.
- Lithic wear-pattern analysis, tools are produced, used for various tasks and the resulting wear-patterns are examined.
Classification: Artifacts and Artifact Types

- Artifact “types” are groupings of artifacts that are similar in some way.
- There are many approaches to identifying “types,” you can use many different criteria depending on your research question.
- Artifacts vary by function (their use), style (which may transmit cultural information), or period (chronological variation).
Morphological Types:

- The most basic typological tool, usually the first step in an analysis.
- Morphological types are categories of artifacts separated by their morphology (shape, size, material, color). The formation of morphological types consists of an effort to group things that are alike.
- Morphological types can follow functional aspects of morphology. Ceramics can be divided into bowls, jars, scoops.
Temporal Types

- Temporal types are types that represent distinct time periods. Types do change through time.
- Temporal types can start as morphological types, such as the identification of a ceramic type or style.
- The morphological types can then be tested against chronological data to see if they occur during a specific time period (Casa Buena).
Seriation

Seriation is the process of sorting materials chronologically or creating temporal types.

Data was typically sorted visually and displayed on graphs.

Change through time among several “types” is often shown on “battleship curves.” Here, columns represent types and the width of the column represents percent of artifacts in a particular assemblage. It shows how much of each type is used at various points in time.
Artifact Attributes, Variables, and Scales: What we use to classify artifacts

- Artifact Attributes are defined as “logically irreducible, independent characteristics having two or more states.”
- For example, length, width, or thickness, of an artifact.
- Artifacts have an infinite number of possible attributes.
- Attributes to be recorded and studied are selected based on the type of study to be conducted and the research questions that you are asking.
VARIABLES: Definitions

- Something (a characteristic) expected to vary
- Something that assumes different values or states
- Something whose value may be dictated or discovered
Types of Variables:

- Present / Absent variables.
- Continuous variables: fall along a continuous line, including fractions. Measurements of length are a common continuous variable.
- Discrete Variables: Can only be specified values 1-5, 6-10, 11-15.
**Types of Scales:**

- **Nominal Scale:** these are non-metric classes, variables or attributes placed in classes which have been given symbols (words).
  - Left – Right
  - Male – Female
  - Basalt, Chert, Obsidian

- **Rules:**
  - Only one symbol per class.
  - Only one class per symbol.
  - Classification must be exhaustive, every item fit in a class (Unknown).
  - Must be mutually exclusive classes, can’t be in two at once.
Interval Scales:

- Like a ordinal scale (same rules) but the classes also imply an equal distance between the symbols.
- Example: temperature readings can be grouped along a scale 1 – 5, 6-10, 11 – 15.
- Interval scales help us to simplify data and graph it in a simplified form.
- Caution: interval scales can be deceptive and hide trends in the data if distances are too long.
Ratio Scales:

- Ratio scales present a quantitative expression of the relationship between two variables.
- Ratios can be derived from other primary variables. For example, the variable population density is a ratio of the number of people per Unit of land = a density of 28 people per square mile.
The different scales and classifications of data are important!

They determine the strength and flexibility of the data being used.

For example: Nominal measures are weak in that they cannot be manipulated mathematically.

Ratios are strong and can be manipulated by all mathematical operations.

BUT, THE TYPE OF VARIABLES AND SCALES USED MUST BE SELECTED IN REGARD TO THE RESEARCH QUESTIONS BEING ASKED.