Fall 9-1-2015

ANTY 454.01: Lithic Technology

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ANTHROPOLOGY 454
LITHIC TECHNOLOGY

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I. GOALS:

The course will provide a comprehensive introduction to method and theory in lithic technology. It will begin with an introduction to lithic raw materials, fracture mechanics, and basics of stone tool knapping. It will cover analytical methods associated with core reduction, tool production, debitage studies, formation processes, use-wear analysis, groundstone studies, and theoretical perspectives on lithics. An important part of becoming a lithic analyst is learning the basics of stone tool manufacture. Students will, therefore, learn the basics of flintknapping and apply the results of their knapping exercises to solving problems in lithic technology.

II. PURPOSE:

A. MISSION STATEMENT:

This course is an elective for anthropology majors.

B. OBJECTIVES FOR THE STUDENT:

1. To identify and understand the range of lithic artifacts made and used by ancient and recent people.
2. To develop concepts that aid in our understanding of how and why people used different lithic technologies.
3. To develop concepts and methods which aid in the interpretation of the archaeological record.
4. To practice analytical skills in evaluating basic archaeological research.
5. To read primary and secondary sources and consider their significance to archaeological problems.

C. GOALS FOR THE STUDENT:

1. To develop a broad perspective on the economy and social organization of past peoples as reflected by lithic artifacts.

2. To develop ability to identify important analytical strategies for researching the archaeological record of lithic technology.
3. To develop the ability to recognize archaeological signatures of past behavior.
4. To be able to use sophisticated theoretical concepts from anthropology to explain change and variation in the organization of lithic technology.

D. GENERAL LEARNING OUTCOMES FOR THE STUDENT:

In addition to basic content-related objectives outlined above, the course has several general liberal-learning goals for developing basic academic skills. With successful completion of this course the student will improve ability in the following areas:

1. To develop the ability to manage data requiring the student to organize information and distinguish between empirical fact, inference, and theory.
2. To develop the ability to understand organizing principles to be used in sorting information.
3. To compare and evaluate arguments.
4. To organize thoughts and communicate these in written form.
5. To practice in synthesizing information during constrained time periods (as in exams).

III. GENERAL REQUIREMENTS

A. PREREQUISITES:

None (recommend Anthropology 250)

B. TEXTS AND READINGS:

Required Texts:

Andrefsky, William, Jr.
2005 *Lithics: Macroscopic Approaches to Analysis*, Second Edition. Cambridge University Press, Cambridge.
Odell, George H.
2003 *Lithic Analysis*. Springer, New York.

Recommended Texts:

Andrefsky, William, Jr. (editor)
2008 *Lithic Technology: Measures of Production, Use, and Curation*. Cambridge University Press, Cambridge.

Goodale, Nathan and William Andrefsky Jr. (editors)
2015 *Lithic Technological Systems and Evolutionary Theiory.* Cambridge University Press, Cambridge.

Shott, Michael J. (editor)
2015 *Works in Stone: Contemporary Perspectives on Lithic Analysis*. University of Utah Press, Salt Lake City.

Grade Determination: The primary goal of this course is to provide an introduction into the methods of lithic artifact analysis. To accomplish this goal the course will include both lecture and a significant amount of "hands-on" experience. Grades will be determined as follows: (1) Two tests covering lecture and readings will be worth 50 points each; (2) Two writing assignments covering technological and functional analysis will also be worth 50 points each; and (3) Students will conduct a research project that will include analysis of lithic artifacts (can be experimentally produced) or lithics data culminating in a 10 page (20 pages for graduate students) typed, double-spaced, research paper (100 points). The project must be approved by the professor and incorporate (1) a discussion of goals, methods, and materials; (2) references to relevant literature; (3) presentation, analysis, and interpretation of the data; (4) conclusions and possible future directions. Students will also briefly present results of their study for class discussion during the final week of the semester.

Graduate students will complete a research paper twice the length of undergraduate projects. The paper should reflect a higher degree of awareness of issues in archaeological research. It should also reflect more intensive background research and consideration of research design.

There are 300 points possible in the class; students with 90% (270 points) or more will receive an "A," etc. Deadlines are extended only in cases of illness (with a doctor's note) or an emergency.

TOPIC AND READINGS SCHEDULE

AUGUST 31 – SEPTEMBER 14:
COURSE INTRODUCTION; LITHICS TERMINOLOGY AND BASIC FRACTURE MECHANICS; INTRODUCTION TO STONE KNAPPING
(GUEST INSTRUCTOR FOR STONE KNAPPING SEPTEMBER 9-14)

Required Reading:
Andrefsky, Chapters 1 and 2
Odell, Chapters 1 and 3

SEPTEMBER 7
HOLIDAY

SEPTEMBER 16 – 18
LITHIC RAW MATERIALS AND SOURCING (GUEST INSTRUCTOR)

Required Required:
Andrefsky, Chapter 3
Odell, Chapter 2

SEPTEMBER 21 – 25
LITHIC CORE REDUCTION: MANUFACTURE AND ANALYSIS OF BIPOLAR CORES; PIECES ESQUILLEES; PREPARED CORES; LEVALLOIS CORES; BLADE CORES; INTRODUCTION TO TYPOLOGY (GUEST INSTRUCTOR)

Required Reading:
Andrefsky, Chapter 7, pages 143-177
Odell, Chapter 3

Recommended Reading:
Goodale and Andrefsky, Chapter 9
Shott, Chapter 12

SEPTEMBER 28 – 30
FLAKE TOOL TECHNOLOGY

Required Reading:
Andrefsky, Chapter 7, pages 160-177
Odell, Chapter 3, pages 62-74

Recommended Reading:
Andrefsky (2008), Chapters 1-3, 5-7
Shott, Chapter 9

OCTOBER 2 – 12
MANUFACTURE AND ANALYSIS OF FORMED TOOLS: BIFACES, PROJECTILE POINTS, DRILLS, AND SCRAPERS; TEST REVIEW

Required Reading:
Andrefsky Chapter 7, pages 177-195
Odell, Chapter 3 and Chapter 4 (pages 87-118)

Recommended Reading:
Andrefsky (2008), Chapters 4, 7, 8, and 9
Shott, Chapter 10

OCTOBER 14
TEST 1

OCTOBER 16 – 30
DEBITAGE ANALYSIS

Required Reading:
Andrefsky, Chapters 5 and 6
Odell, Chapter 4 (pages 118-133)

Recommended Reading:
Shott, Chapters 2-3

NOVEMBER 2 – 16
FUNCTIONAL ANALYSIS: USE-WEAR, RESIDUES, EDGE ANGLES, EMPLOYABLE UNITS ANALYSIS
IMPORTANT: ASSIGNMENT #1 DUE NOVEMBER 2

Required Reading:
Andrefsky Chapter 7, pages 195-200
Odell, Chapter 5

Recommended Reading:
Shott, Chapters 6-8

NOVEMBER 11
HOLIDAY

NOVEMBER 18
GROUNDSTONE

Required Reading:
Odell, Chapter 3 (pages 74-85)

Recommended Reading:
Goodale and Andrefsky, Chapter 15

NOVEMBER 20 – 30
THEORETICAL LITHICS: RECONSTRUCTING PAST BEHAVIOR, ORGANIZATION, AND EVOLUTION

Required Reading:
Andrefsky, Chapters 8 and 9
Odell, Chapter 6

Recommended Reading:
Andrefsky (2008), Chapters 9, 10, 12, 13, and 14
Goodale and Andrefsky, (entire book)
Shott, Chapter 12

NOVEMBER 25 - 27
HOLIDAYS

DECEMBER 2 – 4
OPEN LAB, CONSULTATION AND PROJECT DEVELOPMENT
IMPORTANT: ASSIGNMENT #2 DUE NOVEMBER 30

DECEMBER 7 – 11
PROJECT PRESENTATIONS
IMPORTANT: PAPERS DUE DECEMBER 7

DECEMBER 17
TEST 2
TIME: 8:00-10:00

ANTHROPOLOGY 454: LITHIC TECHNOLOGY ASSIGNMENT #1
TECHNOLOGICAL ANALYSIS OF DEBITAGE

Several approaches to debitage analysis have emerged in the past 15 years: the distinctive assemblage of artifacts approach and the distinctive artifact approach. The former relies on groups of flakes to provide information on reduction techniques, while the latter focuses on attributes of single flakes to provide clues about their technological origins. Within the distinctive artifact approach analysts can choose attribute analysis to recognize patterns reflecting underlying variation in flake types or they can sort flakes into types based upon a general set of characteristics.

Do distinctive artifact assemblage approaches provide accurate results? In this case, can the flake completeness approach of Sullivan and Rozen be used to demonstrate clear differences between core reduction versus tool production assemblages? Do other individual flake-attribute and flake type approaches work better?

Analyze assemblages of flakes resulting from core reduction (hard hammer free hand percussion; prepared or unprepared) and biface production (soft hammer production of bifaces). To accomplish this, produce two sets of flakes. Make a biface and reduce a core and **save all flakes** from each in separate bags. **Be sure to save all experimental results**, but note bottom size cut-off (i.e. if you screen your results through a 1/4, 1/8, etc. inch mesh).

Collect three data sets from each of your two groups of flakes:

1) Distinctive Assemblage Approach: Sort all flakes into Sullivan and Rozen flake types (see diagram in Odell p. 123). Convert all raw frequency data to percentages and produce a bar chart or histogram illustrating the results.

2) Attribute Approach: Count the total number of dorsal flake scars on each flake (flake scars must be > 5 mm. in size). Divide the raw data into three classes (0-1, 2, 3 or more). Count the number of flakes falling into each class and calculate percentages. Construct a bar chart or histogram illustrating the results.

3) Flake Type Approach: Sort all platform-bearing flakes into technological types using the following definitions:

a. Decortication flake: flake with 50-100% cortex on dorsal surface
b. Early stage non-decortication flake: flake with limited cortex (less than 50%) and a high dorsal platform angle; often has a low dorsal and platform scar density
c. thinning flake: thin and broad flake with little or no cortex and a higher dorsal platform angle; typically also has a small platform width compared to maximum flake width; typically has a relatively high dorsal scar density.
d. Edge maintenance/modification flake: thin, small, and comparatively narrow flake;

typically has relatively high dorsal scar density and normally a higher platform angle

Count the number of flakes falling into each type and calculate percentages. Construct a bar chart or histogram illustrating the results

Provide all raw and percentage data and data charts. Answer the following questions:

1. Did the Sullivan and Rozen typology provide any clear indications of differences in your two debitage assemblages? Why or why not?

2. Some lithic technologists have argued that dorsal scar counts can be used to discriminate between different stages of lithic reduction with minimal error. If this is so, then at least 60% of the flakes resulting from core reduction should fall within a single scar count category and 60% of biface reduction flakes should fall in the 3+ category (thus: 0-1=early stage [core reduction]; 2=middle stage (late core reduction and/or early stage biface production); 3 or more=late stage [biface manufacture]). Examine your data. Do the results support this contention? Why or why not?

3. Not all lithics specialists prefer interpretation-based typologies since there is more room for individual error. On the other hand others think this provides the quickest and easiest insight into reduction behavior. How well did this approach work? Was your core reduction assemblage dominated by flakes fitting types “a” and “b”? Was your biface reduction assemblage dominated by flakes fitting types “c” and “d”? Why or why not?

4. Which technique appears most useful? Can you imagine how they might be improved?

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Schedule for Knapping and Lab Sessions

Sept. 9: Introduction to knapping; bipolar cores (outside on grass east side of Social Science Building)

11: Knapping: Freehand core reduction (outside on grass east side of Social Science Building)

14: Knapping: Biface production/billet flaking (outside on grass east side of Social Science Building)

30: Flake Tools Lab. (classroom/TBA)

Oct. 9: Knapping: Pressure flaking and general knapping (outside pending weather…)

19: Debitage analysis Lab. (classroom/TBA)

26: Debitage analysis Lab. (classroom/TBA)

Nov. 4: Functional analysis Lab. (classroom/TBA)

11: Functional analysis Lab. (classroom/TBA)

Dec. 2-4: Open lab/project consultation (classroom/TBA)