

Historical Geology Lab Makerspace Project

You will conduct research on a fossil assigned to you and your lab partner. The research has two aspects: 1) acquisition and comprehension of pertinent literature on some aspect of that fossil's morphology, evolution, or ecology, and 2) use of the UNR Makerspace in the DeLaMare Library to create a state-of-the-art visualization (i.e. digital and/or physical model) of that fossil. At the end of the semester, your team will present the results of your project to the class.

The goals of this project are:

1. To introduce you to types of models that can be produced using the Makerspace, and allow you to gain some hand-on experience in the use of the equipment.
2. To gain practice writing scientific proposals, and better understand the scientific purpose served by generating your digital model and/or physical representation of the specimen.

Some skills you will acquire:

- 3D scanning, creation of physical models, or animation of digital models
- Synthesis of scientific literature
- Writing a research proposal to address a specific scientific problem
- Presentation of your findings to an audience

Tasks:

1. Locate 1 secondary and 1 primary literature reference pertaining to the fossil you are assigned.
 - The secondary reference (review, i.e. text book, lab, or web-based overview) should be used to acquaint yourself with the organism in a general sense.
 - The primary (research article) should be **carefully chosen** *after reading several primary literature sources*, and involve some aspect of the organism's structure, function, or habitat that might be better understood by the creation of a 3-D visualization.
 - These literature sources will be read and summarized early in the semester (**summary of both articles is due February 21**) to serve as a launching point for your work in the Makerspace.
2. Assess from available tools at Makerspace, which is most appropriate to apply to your specimen. You will visit the Makerspace outside of lab time with your partner, to learn about various 3D visualization techniques from the librarians there. Options include:
 - 2-D scan and laser cutting
 - 3-D scanning (photogrammetry or laser) and 3-D animation
 - 3-D scanning and 3-D printing
3. Propose a Makerspace activity to create a model. Written proposals are **due on April 4th**. These should resemble the real research proposals that scientists must submit to funding agencies to gain support for their projects. Your introduction section should describe the fossil and explain the outstanding research question you wish to address. At the end of the introduction you should clearly state the hypothesis of your research proposal. The methods section should detail the procedures used to create your model, and how you propose to use to model to test your hypothesis. The expected results section should

discuss what kinds of data and results you anticipate after completing your hypothesis test, and their significance to the field.

4. Undergo training and with a partner execute the steps to fabricate the model. Each team will be allotted a maximum of \$75 with which to create prototypes and their final product.
5. Presentation to class
 - overview of organism
 - major take-away message from primary research article
 - presentation of fabricated model
 - discuss how model can increase our understanding of some aspect of the fossil
 - reflect on challenges in fabricating the model (including library facilitation, instructor guidance, reflection of personal skill development)

Products:

Written components:

1. Summary of your 2 references. Due February 21
2. 1-page proposal of Makerspace project. Due March 14.

Oral presentation: Presentations should be given as a team, and 10-20 minutes in length. A sign-up for presentation slots will be circulated towards the end of the semester.

Model: Copies of all models and digital products will be turned in for evaluation. A duplicate copy of physical models can be made and kept by the students.

Grading*:

Reference summaries (25%)

Project proposal (25%)

Final product – your model (25%)

Oral presentation (25%)

* this project is worth 35% of your total lab grade