**Research Report Assignment**

The objective of the Research Reports is to provide students a real-world experience in the scientific process. Students will work in groups and choose from a list of research questions, or devise their own research question. Each group will then decide how best to go about answering the question. Along the way, the groups will prepare an Annotated Bibliography of literature relevant to their question, a written project proposal, an oral presentation of the project proposal, a final project presentation, and a final scientific report. All or most of the data used to answer the research question will be collected by the group members from a site (possibly of their choosing) in the greater Tucson area. Below is a list of the required parts of the Research Report, and what is expected for each.

**Available Research Questions**

Each group can choose one question from among this pool of possibilities. The task from there will be to go about answering the question in the best possible manner. Any group that wants to propose their own research question is welcome to, and the instructors will help to develop the project.

* What is the effect of aspect on forest density and composition?
* What is the effect of forest canopy cover on composition and density of ground vegetation?
* How does forest canopy cover influence understory shrub height?
* How does proximity to a riparian area affect tree height and diameter?
* How does tree regeneration and ground vegetation (grasses, forbs, shrubs) differ by burn severity (low, medium, high)?
* What effect does tree species and diameter have on snag retention after high-severity fire?
* How does distance from forest edge affect post-fire regeneration?
* How do existing fuel loads (downed wood and shrub density) differ by past fire severity?

Other Ideas\*

* Desert research questions related to saguaro cactus ecology.
* Map the Tucson Urban Heat Island.

**Annotated Bibliography – DUE March 4, 2014 at 11:59pm MST to the D2L Dropbox**

An annotated bibliography is a list of relevant scientific literature including a concise summary of each article. Each group will need to find and describe at least SIX peer-reviewed scholarly journal articles, book chapters, or technical reports that address the overall context of or a component within the subject of their Research Report. Media sources covering journal articles and websites are not permitted. For each source, you must provide the full citation and 100-150 word summary. All citations in the Annotated Bibliography and all of the Research Report documents should follow the APA citation style.

See <http://www.library.arizona.edu/search/reference/citation-apa.html> for guidelines on using the APA style.

The best way to find peer-reviewed, scholarly articles is to use search engines and databases designed for that exact purpose. A simple Google search will not get you the kinds of sources you will need. The library website has a list of resources to help: <http://www.library.arizona.edu/search/articles/>

I have the best luck with [Google Scholar](http://scholar.google.com/schhp?hl=en) and [Web of Science](http://apps.webofknowledge.com.ezproxy2.library.arizona.edu/UA_GeneralSearch_input.do?product=UA&search_mode=GeneralSearch&SID=2AtusJspge556LMqv4w&preferencesSaved=). If you are on campus and using a wired connection or connecting to UAWIFI, you will have direct access to many pdfs of papers. If you are off campus, you will need to use VPN to connect to the campus network. VPN software is available through the UA site license site.

Note that to fully understand and be able to cite any paper, you will HAVE to access the entire article, either by downloading a pdf or reading the html of the paper online.

This is an example of how each bibliographic item should look:

1) Westerling, A. L., Hidalgo, H. G., Cayan, D. R., & Swetnam, T. W. (2006). Warming and earlier spring increase western US forest wildfire activity. *Science*, 313(5789), 940-943.

Using a database of large wildfires across the western U.S., a record of snow-melt fed stream flow, and March-August temperatures, the authors found strong correspondence in the number of fires and the length of the fire season (from about 1 week to over 5 weeks) with the timing of spring snow melt and spring temperature. Of course, snow melt and spring temperature are highly correlated, but they found that increased temperatures and earlier springs were coincident with low snowfall during the winter. This scenario caused substantial increases in wildfire activity and duration during the 1980’s and given projections of climate change, this pattern could persist or worsen with strong implications for the future of western forests and their state as a carbon sink.

**Project Proposal – DUE March 25, 2014 at 11:59pm MST to the D2L Dropbox**

The project proposal provides an opportunity to address the research question from many angles before going into the field and collecting data. This proposal will follow guidelines of standard scientific approaches to conducting research, including procuring grant funding and permission to sample on private or federally owned lands.

The proposal should clearly describe the research question and its context in terms of relevant literature (including the sources from the Annotated Bibliography), pose hypotheses of probable answers to the question, identify the study area where the data will be collected, and detail the methods to be used to answer the question (i.e., field sampling and analyses). The writing for the proposal must be formal and scientific in nature, including properly formatted in-text citations and a references list in APA style. The full proposal text should be a maximum of 1000 words, double spaced with size 12, Times New Roman font, plus a list of all cited sources (in APA) and any figures and/or tables. The proposal should follow the outline below.

Each proposal will be graded on clarity, completeness, and demonstration of an understanding of the research process and the specific project being proposed.

TITLE

INTRODUCTION

* Background (includes descriptions of relevant literature, and overall context of the research)
* Problem statement (pose the research question)
* Hypotheses (explain each one)

METHODS

* Study Area description (including a map as a figure is a good idea)
* Study Design
* Analyses to be performed

REFERENCES

* Use APA style

Figures/tables

**Proposal Presentation – Presented in Class on March 25, 2014**

To efficiently share your project proposal with the class, get feedback on your approach, ideas, and methods, and to gain more experience preparing and giving an oral presentation, each group will present their proposals in a Powerpoint format. The presentations will be no longer than 5 minutes with an additional 5 minutes for questions. Because the time is very short, not all members of the group have to present, but everyone must be on hand to answer questions. I suggest that you use only 5-7 slides in the presentation, and follow the outline of the written proposal. You will be judged on your organization, clarity in presenting ideas and methods (both speaking and on slides), and demonstration of your overall knowledge of the project.

Presenters MUST email me the powerpoint presentations BEFORE 7:00am on March 25.

**Final Presentation of Research Reports – Presented in Class on April 29, 2014**

The final presentation will detail the research question, hypotheses, study design, study area, analyses, results, interpretation, and conclusions from your Research Report. **ALL group members** must present part of the final presentation – this is a team activity. You will have 15 minutes for the presentation and 5 minutes for a question/answer session. This follows the format for most professional conferences. A great presentation will have well thought out slides with concise text descriptions, clear and readable figures, nice photographs of the work and/or research topic, and flow naturally from slide-to-slide and person-to-person during the presentation. Practicing the presentation 4-5 times beforehand is essential for a smooth and clear delivery, as I expect all the presentations will be. The group will be graded on organization, clarity (in speaking and on slides), presentation style, and knowledge of the research project.

All presentations MUST be emailed to me BEFORE 7:00am on April 29.

**Final Research Report – DUE May 6, 2014 at 11:59pm MST to the D2L Dropbox**

The final report will detail the research question, hypotheses, study design, study area, analyses, results, interpretation, and conclusions. It will be written as a formal, scientific report with headings for each section, full in-text citations and a references list in APA style, with figures and tables that CLEARLY present the data and findings. All of the data collected for the study must accompany the report in a separate MS Excel spreadsheet uploaded to the D2L dropbox. The report text should be a maximum of 2500 words, double spaced, size 12, Times New Roman font. As in any scientific report, you should follow the outline below. As with the proposal, you will be graded on clarity, organization, completeness, quality of the figures, and well-explained interpretations of the data and analyses.

TITLE

ABSTRACT

* 150 word summary of the report – the most important part of any report!

INTRODUCTION

* Background (includes descriptions of relevant literature, and overall context of the research)
* Problem statement (pose the research question)
* Hypotheses (explain each one)

METHODS

* Study Area description (including a map as a figure is a good idea)
* Study Design
* Analyses to be performed

RESULTS

* Objective descriptions of findings, with references to figures and tables

DISCUSSION

* Interpretations of results in terms of answering the research question and addressing the hypotheses
* Put findings in context of the literature and “bigger picture” ideas/problems/issues

CONCLUSIONS

* Brief summary of major findings and potential next steps in research
* What’s the take-home message of your research?

REFERENCES

* In APA style

FIGURES/TABLES