Some qualities of a good term paper:

• Topic spans disciplines, & paper demonstrates that you understand each discipline covered

• Reviews and *synthesizes* available evidence on a focused topic

• Paper is organized, easy to read and understand

• 4 to 10 good references from primary literature *(more is OK)*

• Figures and references are cited correctly

• Scientific evidence is presented in a balanced way without editorializing
References are the backbone to a good paper

• Required: peer reviewed papers from scientific journals
• Wikipedia and online news article are not acceptable references.
• URL’s are not an acceptable form of referencing.
Referencing

In-text referencing should be in the scientific style: (first author, year of publication) with single, dual and multiple author papers having slightly different callouts, as in:

Larvae have been found to go with the flow (Fuchs, 2015). However, recent evidence shows that they have sometimes stick in the mud (Sikes and Fuchs, 2016). This appears to be due to changes in current and sediment structure (Wilkin et al, 2017).
Bibliography


Referencing format

**YES:**
- This leads to the actual paper.

**NO:**
- This leads to a link to a link to a paper. It is NOT a reference.
Writing style

• Organization and writing style are important for getting your point across.

• Improving your writing style will help you present your ideas more clearly.

• Many ways to improve your writing style
  – see style tips on class web page:
  – “Tips for good writing” -- Hirsch 2005
  – “Me write pretty one day” -- Wells 2004
Write factually but not dramatically
Science doesn’t report it as a crisis

No matter how worrisome the data is
Structure is important:

• Give your writing a strong framework
• Tell us what you will say
• Say it →
• Tell us what you said.
Paper should have a beginning, middle, and end

**Introduction**

Start with a concise overview of what the paper is about. What will you tell us?

**Body of paper & Supporting figures**

Present, discuss and synthesize the evidence on your topic. Try to devote equal time to each discipline covered. If appropriate, present competing views. Tell us a story that has a logical plot progression.

**Summary & conclusions**

Provide a recap of the topic you explored. This should summarize the big picture as it stands now. What did you tell us?
Each paragraph should be about a **single idea** and should have a beginning, middle, and end.

<table>
<thead>
<tr>
<th>Topic sentence</th>
<th>What is the general idea of this paragraph?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body of paragraph</td>
<td>Write about the idea.</td>
</tr>
<tr>
<td>Connecting sentence</td>
<td>What is the conclusion of this idea, and how does it lead into the next paragraph?</td>
</tr>
</tbody>
</table>
Figures

• A figure should illustrate one of your discussion points

• Include a caption that explains why the figure is there

• Refer to the figures by number in the text

• Cite the source of the figure in the caption
CO₂ in the atmosphere is rising (NOAA, 2015)
CO₂ in the atmosphere is rising, but the levels also show an annual cycle due to the yearly cycle in photosynthesis (Figure 1).

Figure 1: CO₂ in the atmosphere. The levels also show an annual cycle due to the yearly cycle in photosynthesis (NOAA, http://www.seafriends.org.nz/issues/global/co2_distribution.jpg)
References

• References must be cited properly to avoid plagiarism

• Sources should be scientific journals, not newspapers, blogs, Wikipedia, etc.
  – Books okay if used sparingly
  – More on this topic ...next
Wrong and right ways to cite your references: some examples

Ocean circulation plays a key role in regulating atmospheric CO$_2$ concentrations on glacial-interglacial timescales, with a combination of changes in ocean overturning, stratification, biological nutrient uptake, and carbonate compensation required to explain the observed glacial decrease of ~80 ppm in atmospheric CO$_2$. The formation of deep water in the North Atlantic ventilates the deep ocean today, and changes in this Atlantic Meridional Overturning Circulation (AMOC) during glacial intervals likely contributed to the reduction of atmospheric CO$_2$ in the past.

From Sigman et al., 2010 Nature
A combination of changes in ocean overturning, stratification, biological nutrient uptake, and carbonate compensation are required to explain the observed glacial decrease of ~80 ppm in atmospheric CO$_2$. More blah blah on this topic....
WRONG - slightly better, but still plagiarism. Lack of quotes implies that these are your words.

A combination of changes in ocean overturning, stratification, biological nutrient uptake, and carbonate compensation are required to explain the observed glacial decrease of $\sim 80$ ppm in atmospheric CO$_2$ (Sigman et al., 2010). More blah blah blah on this topic....
BETTER (but only slightly) - the quotes indicate that you borrowed the words, and the source is acknowledged.

“A combination of changes in ocean overturning, stratification, biological nutrient uptake, and carbonate compensation are required to explain the observed glacial decrease of ~80 ppm in atmospheric CO$_2$ “(Sigman et al., 2010 ). More blah blah blah on this topic….

Rule of thumb: If you copy more than four words, they should be in quotes with a reference. The exception is long scientific terms, e.g. “El Nino Southern Oscillation Index.”
The observed glacial decrease of ~80 ppm in atmospheric CO₂ need a combination of changes in ocean overturning, stratification, biological nutrient uptake, and carbonate compensation are to explain the observed glacial decrease of ~80 ppm in atmospheric CO₂ (Sigman et al., 2010). More blah blah on this topic....
Where to find scientific journal articles

**Rutgers Library access:**
Use the available indexes, they include only journal articles and abstracts

http://www.libraries.rutgers.edu/indexes

**Google Scholar**
Accessible anywhere
Includes journal articles, books, and tech. reports

http://scholar.google.com/

Best references are highly cited journal articles
How to find databases in the Rutgers system:

• To start in the Rutgers system go to “indexes and databases” which can be found on the “find articles” tab on the library web page:
  – http://www.libraries.rutgers.edu/indexes
  – For oceanography 2 indexes are excellent:
    – Web of Science
    – geoRef
How to **choose** references

- Stick to your topic
- Choose a few *recent* articles
  - Read them and have a look at the papers they reference
  - Choose papers that stick to the topic
- Look those up
  - Let the experts guide your research
  - Who do **they** reference?
Primary literature versus Secondary etc

• Primary literature is original research
  – Peer reviewed
• Review articles are primary literature.
• “Secondary” literature
  – Non-reviewed articles from scientific magazines
  – Science texts
  – Web pages
• Tertiary-
  – Newspaper articles
  – Web pages
Advice on choosing your term paper topic

The paper is 20% of the grade. It should be 2200-2500 words minimum 2 figures, 4 references.

The topic has to be interdisciplinary and on some aspect of a topic covered in the course. Interdisciplinary means it addresses 2 of the basic disciplines. These are:

- Physical, chemical biological geological aspects of oceanography.
- Any aspect of hydrothermal vents and their fauna are not an acceptable topic.

Term paper topic IDEAS
Hydrothermal vents topics are not acceptable.
Pollution
- Plastics in the ocean
- Nutrient pollution effects on estuarine ecosystems (Eutrophication)
- Oil spills: effect of currents and location on biological effect and remediation e.g. The Gulf Oil spill vs Exxon Valdez
- Anthropogenic carbon dioxide emissions and its effects (temperature, ocean acidification, circulation) on marine ecosystems
- Ocean acidification effects on calcifying organisms
- Global warming: temperature effects on marine ecosystems
- Harmful algal blooms: currents/ toxicity and biology
- The effects of natural cycles on fisheries e.g. El Niño effects on productivity (primary and secondary) or carbon cycling
- Antarctic Krill:
- survival skills in an extreme environment
- changes in ecosystem structure with climate change
- Ocean ecosystem structures – stresses and changes with climate change
- Estuaries, metals, and pollution: it’s not just a matter of dilution
- Coastal dead zones – nutrients or geochemical and circulation interactions.
- Iron fertilization and the biological pump effect on CO₂ sequestration
- CO₂ sequestration in the ocean biology versus chemistry and the effect of circulation.
- El Niño effects on productivity (primary and secondary) or carbon cycling
- Ocean circulation – climate interactions.

A comment on climate change papers in general: There are multiple ways climate change can affect marine systems the basic ones we cover in class are consequences due to warming (sea level rise, thermal stress) and the chemical consequences due to CO₂. These each have effects on ecosystems and currents and feedbacks. It is important to keep these fundamentals distinct when researching and writing up an interdisciplinary topic.
A good “starter outline” should include

• Indication of paper focus.
• Three references.
• Proper citations.
• Incorporation of information from those references to guide your direction
• Concrete examples of the material you will cover & discuss.
• “Where are they going?”