10-2017

Fundamentals of Biology Research Project [Biology]

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Fact Sheet for SCB 201 Laboratory Sections 186B

186B; 187B; 189B

LaGuardia Community College
Department of Natural Sciences
Spring I, 2017

Overview

1. The goal of this initiative is to improve students' learning of the subject while developing their Inquiry and Problem-Solving competencies as well as their numeracy, written, digital and oral communication abilities.
2. A "flipped-class" approach will be taken to present different topics ahead of the practical laboratory experiences. Topics will be presented with PowerPoints and/or videos posted on Blackboard.
3. Students will be given a "low stakes" quiz at the beginning of each laboratory session to assess their knowledge and understanding of the posted material.
4. A research project, introduced at the beginning of the semester, will be used as the backbone to integrate inquiry and problem-solving competencies to the laboratories.
5. Each laboratory will explore a question/aspect outlined in the research project; students will be expected to work in pre-assigned groups and present individual written outputs, data, and analysis at the end of each laboratory session.
6. Students will be expected to compile their results obtained during the semester, and make a digital/oral presentation at the end of the term.
7. Students will collect background information and complete four written assignments; students will receive feedback on these assignments to allow for improvements and successful completion of the final presentations.
8. Each individual student will also be required to write three laboratory reports.
9. Collaborative work with group members will be essential for successful learning using an Inquiry and problem-solving approach, although written reports will be marked individually, per the guidelines given in the assignments.
10. The syllabus for the lecture component of these sections is identical to the syllabus of the standard versions of this course; the grading procedures for the laboratory component of the course are modified as described in the grading policy below.

Grading Policy

1. The grading criteria for these sections are identical to the grading criteria of the standard versions of this course for the lecture component of the course.
2. The grading criteria for the lab component for these sections will be as follows:

7 Pre-lab quizzes (lowest grade dropped) (1.6 pts each)	10%
2 Post-lab quizzes (5 pts each)	10%
4 Written assignments (5 pts each)	20%
5 Laboratory notebook in-lab completion (3 pts each)	15%
3 Written lab reports	20%
Group presentation	25%
Total	100%

Students are required to print out the lab handouts posted on Blackboard, and bring a paper copy to each one of the labs.
Attendance is mandatory for all labs. It will be the student's responsibility to communicate with her/his group members to find out what information she/he needs to compile. There are no make-ups for laboratories. Deadlines for uploading of assignments and reports must be met as there will be penalties for late submissions. No submissions will be accepted two days after the deadline.

Being 10-minutes late will result in missing pre-lab quizzes and receiving zero and absent mark for that specific lab session.

I, _____, have read all this information,
(print your first and last name and sign here)
understand it, and am willing to comply with the requirements, as stated above, for the SCB201 Laboratory.

I registered for section _____.

SCB 201 Laboratory Spring I 2017 Assignment 1

This first assignment is meant to help you build the background you will need when preparing your group presentation, as well as preparing your final research report.
Grading: This assignment is worth 1.7% of your final lab grade (total 34%). You will be graded on the following aspects (follow instructions):

-Use of the articles from the links below.
-Clarity of summary, use of own words to describe the ideas in the article.
-Relevance of article.
-Proper APA format used for references.

Purpose: To summarized reliable documents, which provide background information on various aspects relating to water quality, and water testing techniques, for the geographical area you will be researching this term.

Assignment Description:

1. Provide a summary of the main ideas and information discussed in each article (less than a paragraph for each summary, use **YOUR OWN WORDS, NO QUOTATIONS).**

2. For each one of the articles, write the summary *(in your own words)*, followed by the **reference using the APA format***. Below, we have provided you with an example of a summary and reference.

3. This assignment is due on Tuesday, March 14th, before midnight. You must upload your assignment, as a word file, onto BB. Don't wait until the last minute to upload your homework.

***you can find instructions on the APA format in the following website:**
https://owl.english.purdue.edu/owl/resource/949/01/

Example of a summary and reference:
In this article, Vannevel provides insight into the importance of considering societal aspects, beyond scientific and technological advances, when establishing policies to promote water sustainability. Vannevel posits that examining recent history relating to water governance, represents a more effective tool for determining future governance, than does solely looking at recent scientific and technological advances. To demonstrate his point, the author examines two cases, one in London (UK) and one in Ghent (Belgium).

Reference:
Vannevel, R. Learning from the past: Future water governance using historic evidence of urban pollution and sanitation. (2016). *Sustainability of Water Quality and Ecology*. *In Press*. Retrieved from http://dx.doi.org/10.1016/j.swaqe.2016.09.002.

To complete your assignment, please access the necessary documents through the links provided below. You only need to read the material related to the water body you are researching, i.e., either Oyster Bay or East River.

The following are the links for the assignment for Oyster Bay:

To get more information about Oyster Bay watershed, click on the following link:
http://www.dec.ny.gov/docs/water_pdf/wiatllisobhb.pdf
Once you find the page, you will see the link for different sites, choose the Oyster bay Harbor: Oyster Bay Harbor (1702-0016), and click on that. The information of this site would be on Page 8-10 of this report.

Long Island Sound Study:
http://longislandsoundstudy.net/issues-actions/water-quality/

COASTAL FISH & WILDLIFE HABITAT ASSESSMENT FORM
https://www.dos.ny.gov/opd/programs/consistency/Habitats/LongIsland/Oyster_Bay_Cold_Spring_Harbor.pdf

The following are the links for the assignment for East River:

Greening the Gap -Water quality- pages 1-18 (FOR THIS ARTICLE, YOU CAN WRITE A SLIGHTLY LONGER SUMMARY, 200 words).
https://eastharlemstudio.files.wordpress.com/2013/03/tm-water-quality.pdf

East River Upper Reports, pages 1-7
http://www.dec.ny.gov/docs/water_pdf/wiatllisbrer.pdf

SCB 201 Laboratory Spring I 2017 Assignment 2

For this assignment, you need to write ONLY ON THE WATER BODY YOU ARE RESEARCHING

Rubrics for Grading:

-Both abstract and introduction must cover all the points outlined in the guidelines below.

-Sentences must be clear, with no spelling or grammatical mistakes.

-Specific information must be referenced, no quotations should be used.

-List of references must be written in proper APA format.

-Abstract and Introduction must not exceed the word limits (250 for Abstract and 400 for Introduction). Anything beyond this word count will not be considered as part of the assignment.

Due date:

The assignment should be posted on BB before midnight, March 28th.

Late submission will result in a 0.5% reduction point per day of the total grade for this assignment which is 1.7%.

ABSTRACT (200-250 words)

Using the provided links below about Oyster Bay watershed or about East River, write an overview which includes the following points:

- Why is the study of water quality important?
- Give some examples of how water quality impacts the ecosystems and human life?
- What is the purpose (what are you seeking to find out) of your study on water quality at either “East River” or “Oyster Bay Harbor”?

2- INTRODUCTION (300-400 words)

Address the following questions in your introduction, use you own words and clearly follow any specific information with the proper references. Don’t use any direct quotations.

- Why is the study of water quality important? In your introduction, you must develop this idea in more detail than you did in the abstract; you must also cite the proper references
- What are the sources of water pollution in general? Again, here you should name the sources and state some examples and references.
- Identify the specific sources of pollution on either of these sites.
- Why is studying water quality at these two sites (either East River or Oyster Bay) important? How does water quality, at either one of these sites, impact the following: ecosystem, human health, and economy?

- Explain one or more possible impact(s) your study could have on your community and the world in general? (here you can focus on the results of your study, or how doing this study impacts you and how that may impact others, or both)

The following are the links for the assignment for Oyster Bay:
To get more information about Oyster Bay watershed, click on the following link:
http://www.dec.ny.gov/docs/water_pdf/wiatllisobhb.pdf
Once you find the page, you will see the link for different sites, choose the Oyster bay Harbor: Oyster Bay Harbor (1702-0016), and click on that. The information of this site would be on Page 8-10 of this report.

Long Island Sound Study:
http://longislandsoundstudy.net/issues-actions/water-quality/
COASTAL FISH & WILDLIFE HABITAT ASSESSMENT FORM
https://www.dos.ny.gov/opd/programs/consistency/Habitats/LongIsland/Oyster_Bay_Cold_Spring_Harbor.pdf
Water Quality Monitoring Program (using this site for your assignment is optional but it contains very useful information which makes your argument in the abstract and introduction stronger.)
http://friendsofthebay.org/wp-content/uploads/2011/06/WQMR13-14-lr.pdf

The following are the links for the assignment for East River:
Greening the Gap -Water quality- pages 1-18 (FOR THIS ARTICLE, YOU CAN WRITE A SLIGHTLY LONGER SUMMARY, 200 words).
https://eastharlemstudio.files.wordpress.com/2013/03/tm-water-quality.pdf
East River Upper Reports, pages 1-7
http://www.dec.ny.gov/docs/water_pdf/wiatllisbrer.pdf

SCB 201 Laboratory Spring I 2017 Assignment 3

The purpose of this assignment is for each group to work on the background for the final report. Each group must put together the different data (from different labs), and integrate all the information to illustrate how various properties of water, studied during this semester, affect critical biological processes, and as a consequence, living organisms. Each group must also include, in the final discussion, a thoughtful statement on how the experience of doing research on these bodies of water, informed the members of the group on ways in which scientific research can impact communities.

Please read all the guidelines before starting this assignment.

GENERAL GUIDELINES:

1. **Each group will submit only 1 assignment.**
2. **The specific topics for the assignment are given below; each group will only have to focus on the particular topic corresponding to the group number.**
3. **All members of the group must contribute equally to the work.**
4. **Each individual student must keep a log documenting their contributions and time dedicated to the paper.**
5. **Every student will also fill out one evaluation sheet for each member of the group. The evaluation sheet is provided below.**
6. **Evaluation sheets must be printed, filled, and turned in to your instructor on the same day the paper is due.**

RUBRICS: Your paper should have all the elements called for in the guidelines. The marks assigned to each section are presented below:

ABSTRACT	10
INTRODUCTION	15
RESULTS	30
DISCUSSION	30
CONCLUSION AND FUTURE WORK	10
REFERENCES	5

Make sure your paper has all the sections above. YOUR PAPER MUST BE TURNED IN BY THE ESTABLISHED DEADLINE. You will also be evaluated on the following aspects (GO OVER YOUR PAPER AND CHECK EACH BOX ONCE YOU HAVE MADE SURE ALL POINTS ARE FULFILLED)
Clearly written: complete sentences, free of basic grammatical errors. Your writing should demonstrate that you have a clear understanding of the material you are presenting. ☐
Properly organized, points logically ordered, important points are emphasized and clarified. ☐
Quality of the information: must be fully supported by published data, in peer-reviewed papers or in publications from the EPA, NYC GOV, FAO or other United Nations Organizations. ☐
REFERENCES MUST BE PROPERLY CITED USING APA. If you have forgotten how to write your references, please get help from the writing center ☐

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TOPICS: BELOW ARE THE TOPICS. ONLY WRITE ON THE TOPIC CORRESPONDING TO YOUR GROUP NUMBER. MAKE SURE YOU GIVE ALL THE INFORMATION ABOUT YOUR RESEARCH SITE.

Groups 1, 2 and 5:

Topic: The effect of salinity and dissolved oxygen on aquatic organisms (including, but not limited to, bacteria, phytoplankton, plants and animals)

Before writing your report on the topic, make sure you have a clear understanding of the following concepts:

Osmosis

The affinity of water for NaCl and O2

Dissolved oxygen (DO): what does DO mean? What are the average levels of DO for freshwater bodies and oceans?

How and why does salinity affect dissolved oxygen?

What factors, other than salinity, can affect the levels of DO and therefore the number of aquatic organism?

How does salinity affect living organisms? How do cells regulate osmolarity?

How does oxygen affect cell respiration and fermentation?

How does photosynthesis affect dissolved oxygen?

Relate your own findings and data obtained in the osmosis and diffusion, **cell respiration and fermentation and photosynthesis labs,** as well as any other information gathered from reliable sources, to describe the effect of salinity and dissolved oxygen on aquatic organisms.

Your paper should contain the following parts:

Abstract: A **summary** **(200 words maximum)** explaining:

1. Why salinity and dissolved oxygen are important in aquatic life; be specific when outlining each point.

2. What was the main purpose of the research you are presenting -this would relate to the main topic-, in other words, what kind of information were you looking for, and what questions did you ask to get that information. Here you must include the different labs, and clearly relate how the questions asked will inform you on the main topic.

3. Your findings and the methods you used for collecting your data.

Introduction: The background knowledge should be written as an introduction. Support your statements using data and peer-reviewed references.

Results: Present your findings and results from the osmosis and diffusion, cell respiration and fermentation, photosynthesis. You can pool your data together, illustrate your findings (if you took pictures during the lab, for example). Remember to present your data in a manner that will be useful for your discussion.

Discussion: Remember that your topic is **the effect of salinity and dissolved oxygen on aquatic organisms.** In your discussion, make sure you relate your results to the topic, how they illustrate what you are proposing.
Compare your results and findings with the background knowledge and see if your findings are similar or different to results obtained by other scientists. In either case, propose (and explain) why your data is or is not in agreement with previously published data.

Conclusion and future work: Clearly explain the importance of your study, including how this study improved your own understanding about your environment; for example, before doing this study, did you know the effects of salinity on aquatic life? Has doing this project given you some understanding on the ways scientific research can improve community awareness about the environment?

References: in APA format

Groups 3 and 4:

The effect of the dissolved CO_2, pH and temperature on aquatic life (including, but not limited to, bacteria, phytoplankton, plants and animals)

Before writing your report on the topic, make sure you have a clear understanding of the following concepts:
Cellular respiration
Photosynthesis
Enzymes: how are enzymes, in general, affected by temperature and pH.
What factors, other than salinity, affect the levels of dissolved CO_2 in the water?
When CO_2 dissolves in water, how does this affect the pH?
What are possible causes for increased alkalinity in water? What are the effects of increased alkalinity on aquatic organisms?
What factors affect the temperature of bodies of water such as East River or Oyster Bay

Relate your own findings and data obtained in the cellular respiration and fermentation, photosynthesis and enzymes labs, as well as any other information gathered from reliable sources, to describe the effect of dissolved CO_2, pH, and temperature, on aquatic organisms.

Your paper should contain the following parts:

Abstract: A **summary** **(200 words maximum)** explaining:
1. Why dissolved CO_2, pH, and temperature are important in aquatic life.
2. What was the main purpose of the research you are presenting -this would relate to the main topic-, in other words, what kind of information were you looking for, and what questions did you ask to get that information -here you must include the different labs, and clearly relate how the questions asked that will inform you on the main topic
3. Your findings and the methods that you used for collecting your data.
Introduction: The background knowledge should be written as an introduction. Support your statements using data and peer-reviewed references.

Results: Present your findings and results from the enzymes, cell respiration and fermentation, photosynthesis labs. You can pool your data together, illustrate your findings (if you took pictures during the lab, for example). Remember to present your data in a manner that will be useful for your discussion.

Discussion: Remember that your topic is **the effect of CO_2, pH and temperature on aquatic organisms.** In your discussion, make sure you relate your results to the topic, how they illustrate what you are proposing.
Compare your results and findings with the background knowledge and see if your findings are similar or different to results obtained by other scientists. In either case, propose (and explain) why your data is or is not in agreement with previously published data.

Conclusion and future work: Clearly explain the importance of your study, including how this study improved your own understanding about your environment; for example, before doing this study, did you know the effects of pH and temperature on aquatic life? Has doing this project given you some understanding on the ways scientific research can improve community awareness about the environment?

References: in APA format

SCB 201 Laboratory Spring I 2017 Assignment 4

This assignment is your final written report. Use your assignment #3 as a starting point for this final report, add the information from other labs which you may not have added in assignment #3.
Regardless of the topic, the paper must present the data from all the labs, including: Osmosis and Diffusion, DNA purification and analysis of results of DNA sequences coding for 16 sRNA, Cell Respiration, Photosynthesis, Enzymes (catalase), Evolution.
Each group must put together the different data (from different labs), and integrate all the information to illustrate how various properties of water, studied during this semester, affect critical biological processes, and therefore, living organisms.

Each group must also include, in the final discussion, one or two sentences reflecting on the following aspects, related to the experience gained by doing this research throughout the semester (you can give examples, like what you learned about CO_2 and water, and all the factors discussed around this topic):
-How the research made you see the connections between different disciplines, give examples
-What you learned about your own surroundings and events occurring outside the classroom
-What you learned about global factors affecting water quality, what you think may be possible solutions to the problems you identified
-What you gained personally by doing this research, and how this will affect what you do in the future

Please read all the guidelines before starting this assignment.

GENERAL GUIDELINES:

1. Each group will submit only 1 assignment.
2. The specific topics for the assignment are given below; each group will only have to focus on the topic corresponding to the group number.
3. All members of the group must contribute equally to the work.
4. Each individual student must keep a log documenting their contributions and time dedicated to the paper.
5. Every student will also fill out one evaluation sheet for each member of the group, as well as a self-evaluation. The evaluation sheet is provided below.
6. Evaluation sheets must be printed, filled, and turned in to your instructor on the same day the paper is due.

RUBRICS: Your paper should have all the elements called for in the guidelines. The marks assigned to each section are presented below:

ABSTRACT 10

INTRODUCTION 15

RESULTS 30

DISCUSSION 30

CONCLUSION AND FUTURE WORK 10

REFERENCES 5

Make sure your paper has all the sections above. YOUR PAPER MUST BE TURNED IN BY THE ESTABLISHED DEADLINE. You will also be evaluated on the following aspects (GO OVER YOUR PAPER AND CHECK EACH BOX ONCE YOU HAVE MADE SURE ALL POINTS ARE FULFILLED)
Clearly written: complete sentences, free of basic grammatical errors. Your writing should demonstrate that you have a clear understanding of the material you are presenting. ☐
Properly organized, points logically ordered, important points are emphasized and clarified. ☐
Quality of the information: must be fully supported by published data, in peer-reviewed papers or in publications from the EPA, NYC GOV, FAO or other United Nations Organizations. ☐
REFERENCES MUST BE PROPERLY CITED USING APA. If you have forgotten how to write your references, please get help from the writing center ☐

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TOPICS: BELOW ARE THE TOPICS. ONLY WRITE ON THE TOPIC CORRESPONDING TO YOUR GROUP NUMBER. MAKE SURE YOU GIVE ALL THE INFORMATION ABOUT YOUR RESEARCH SITE.

Groups 1, 2 and 5:

Topic: The effect of salinity and dissolved oxygen on aquatic organisms

(including, but not limited to, bacteria, phytoplankton, plants and animals)
Your paper should contain the following parts:

Title: You can write your own title, or use the topic as a title, followed by a subtitle with the name of the area where your samples were collected.

Abstract: A summary (200 words maximum) explaining:
1. Why salinity and dissolved oxygen are important in aquatic life; be specific when outlining each point. *You do not need to provide examples in the abstract, this should be done in the introduction*.
2. What was the main purpose of the research you are presenting -this would relate to the main topic- you must include the different labs, and clearly relate how the questions asked will inform you on the main topic.
3. Your findings and the methods you used for collecting your data.
NOTE: You do not need to include references in the abstract.

Introduction: The background knowledge should be written as an introduction. Support your statements using data and peer-reviewed references. In your introduction, you should present information regarding things like:

- **The affinity of water for NaCl and O2**
- **Dissolved oxygen (DO): what does DO mean? What are the average levels of DO for freshwater bodies and oceans?**
- **How and why does salinity affect dissolved oxygen?**
- **What factors, other than salinity, can affect the levels of DO and therefore the number of aquatic organisms?**
- **How does salinity affect living organisms? How do cells regulate osmolarity?**
- **How does oxygen affect cell respiration and fermentation, aerobes and anaerobes?**

How does photosynthesis affect dissolved oxygen?
How does salinity affect bacterial populations? What types of bacteria are commonly found in oceans?
How does dissolved oxygen affect bacterial populations?
What conditions affect changes in salinity in oceans, and what impact do these changes have on marine life?
How does metagenomics give us insights into the role of bacteria in determining the chemistry of water? *
How does metagenomics allow us to study the impact of changes in the chemistry of water on living organisms? *

***For a good summary on these topics read the following sections:**
The Global Importance of Subsurface Microbial Communities
New Insights from Genomic Data on Subsurface Ecosystems
From the article: *Microbial Metagenomics Reveals Climate-Relevant Subsurface Biogeochemical Processes.*
Philip E. Long, Kenneth H. Williams, Susan S. Hubbard, Jillian F. Banfield
Trends in Microbiology, Volume 24, Issue 8, p600–610, August 2016
Link: **http://www.sciencedirect.com/science/article/pii/S0966842X16300208**

Results: Present your findings and results from the following labs:
Osmosis and diffusion
Cell respiration and fermentation
Photosynthesis
Enzymes
DNA purification and analysis (for the assignment, you do not need to present the electrophoresis results)

Evolution
Please follow guidelines in the "Lab report guidelines" for the formatting and labeling of tables and figures (including pictures and graphs). Also, make sure you address any problems identified by your instructor in your presentation of results in assignment #3, as well as in your lab reports.
You can pool your data together, illustrate your findings (if you took pictures during the lab, for example). Remember to present your data in a manner that will be useful for your discussion.

Discussion: In your discussion, make sure you relate your results to the topic, and how they illustrate what you are proposing. For assignment #4, your

discussion should include analysis and interpretation of the results from all the labs listed in the results section.
Compare your results and findings with the background knowledge and see if your findings are similar or different to results obtained by other scientists. In either case, propose (and explain) why your data is or is not in agreement with previously published data.

Conclusion and future work:

Clearly explain:
a) the importance of your study, including how this study improved your own understanding about your environment
b) How the research made you see the connections between different disciplines, give examples
c) What you learned about your own surroundings and events occurring outside the classroom
d) What you learned about global factors affecting water quality, what you think may be possible solutions to the problems you identified
e) What you gained by doing this research, how will this affect what you do in the future (each member of the group may have a different idea, include everyone's opinion on this item).

References: in APA format

PLEASE MAKE SURE YOU FOLLOW INSTRUCTIONS GIVEN TO YOU FOR ASSIGNMENTS 1 AND 2. References should only include papers which are referenced in your report.

Groups 3 and 4:

Topic: The effect of the dissolved CO_2, pH and temperature on aquatic life (including, but not limited to, bacteria, phytoplankton, plants and animals)

Your paper should contain the following parts:

Title: You can write your own title, or use the topic as a title, followed by a subtitle with the name of the area where your samples were collected.

Abstract: **A summary (200 words maximum) explaining:**

1. Why dissolved CO_2, pH, and temperature are important in aquatic life.

2. What was the main purpose of the research you are presenting -this would relate to the main topic-, in other words, what kind of information were you looking for, and what questions did you ask to get that information

3. Your findings and the methods that you used for collecting your data.

NOTE: You do not need to include references in the abstract.

Introduction: **The background knowledge should be written as an introduction. Support your statements using data and peer-reviewed references. In your introduction, you should present information regarding things like**

- **How does carbon dioxide dissolve in water?**
- **What factors affect the amount of dissolved CO_2 in water?**
- **How and why does temperature affect the chemistry of water, including the amount of dissolved CO_2?**
- **What are the average levels of CO_2 in water bodies like Oyster Bay or East River?**
- **How does dissolved CO_2 affect aquatic life (how does it affect plants, animals, bacteria and other organisms?)**
- **How does CO_2 affect water pH and why**
- **How does pH affect living organisms? How do changes in the pH of water affect aquatic organisms?**
- **How do temperature and pH affect cell respiration and fermentation, aerobes and anaerobes?**
- **How does photosynthesis affect the amount of CO_2 dissolved in water?**
- **How do temperature, pH and CO_2 affect bacterial populations? What types of bacteria are commonly found in oceans?**
- **What conditions affect changes in temperatures in oceans, and what impact do these changes have on marine life?**
- **How do metagenomics give us insights into the role of bacteria in determining the chemistry of water?***
- **How do metagenomics allow us to study the impact of changes in the chemistry of water on living organisms?***

***For a good summary on these topics read the following sections:**

The Global Importance of Subsurface Microbial Communities

New Insights from Genomic Data on Subsurface Ecosystems

From the article: *Microbial Metagenomics Reveals Climate-Relevant Subsurface Biogeochemical Processes.*

Philip E. Long, Kenneth H. Williams, Susan S. Hubbard, Jillian F. Banfield

Trends in Microbiology, Volume 24, Issue 8, p600–610, August 2016
Link: http://www.sciencedirect.com/science/article/pii/S0966842X16300208

Results: **Present your findings and results from the following labs:**
Osmosis and diffusion
Cell respiration and fermentation
Photosynthesis
Enzymes
DNA purification and analysis (you do not need to present your electrophoresis results for this paper, only for the lab report)
Evolution.
Please follow guidelines in the "Lab report guidelines" for the formatting and labeling of tables and figures, including pictures and graphs. Also, make sure you address any comments made to your presentation of results in assignment #3.
You can pool your data together, illustrate your findings (if you took pictures during the lab, for example). Remember to present your data in a manner that will be useful for your discussion.

Discussion: **In your discussion, make sure you relate your results to the topic, and how they illustrate what you are proposing.**
Compare your results and findings with the background knowledge and see if your findings are similar or different to results obtained by other scientists. In either case, propose (and explain) why your data is or is not in agreement with previously published data. For assignment #4, your discussion should include analysis and interpretation of the results from all the labs listed in the results section.

Conclusion and future work:

Clearly explain:
a) the importance of your study, including how this study improved your own understanding about your environment
b) How the research made you see the connections between different disciplines, give examples
c) What you learned about your own surroundings and events occurring outside the classroom
d) What you learned about global factors affecting water quality, what you think may be possible solutions to the problems you identified

e) What you gained by doing this research, how will this affect what you do in the future (each member of the group may have a different idea, include everyone's opinion on this item).

References: in APA format
PLEASE MAKE SURE YOU FOLLOW INSTRUCTIONS GIVEN TO YOU FOR ASSIGNMENTS 1 AND 2. References should only include papers which are referenced in your paper.

EVALUATION SHEET: EVERY MEMBER OF THE GROUP MUST SUBMIT ONE SHEET FOR EACH ONE OF THE OTHER MEMBERS OF THE GROUP

Student's Name: **Evaluator's Name:**		**Excellent**	**Good**	**Fair**	**Poor**	**Unacceptable**
	Collaboration: Worked cooperatively with others					
<u>Excellent</u>: present for every meeting; contributed to the highest degree; MET ALL DEADLINES	**Participation: Contributed "fair share" to team project, given the nature of individual assignment**					
<u>Good:</u> present at all meetings; contributed well and regularly; MET MOST DEADLINES	**Attitude: Displayed positive approach and made constructive comments in working toward goal**					
<u>Fair:</u> present at all but one or so meetings; contributed from time to time; MET HALF OF THE DEADLINES	**Attended planning sessions, was prompt, and participated in decision making**					
<u>Poor:</u> missed two or more meetings; contributed when prompted; MET LESS THAN HALF THE DEADLINES	**Participated in identifying and defining problems and working toward solutions**					
Unacceptable was not present at all; did not contribute to effort at all; DID NOT SUBMIT ANY WORK	**Shared responsibility for tasks to be accomplished**					
	Made suggestions, sought feedback, showed interest in team decision making and planning					

	Followed through in completing own contributions to team project					

GUIDELINES FOR FINAL ORAL/DIGITAL PRESENTATION
SCB-201 LAB

Purpose: Your oral/digital presentation will convey to others, the information gathered throughout the semester, on the effects of particular physical and chemical properties of water on aquatic organisms.
Use your assignment #4 as a guide for preparing the content of your presentation.

Format for presentations:

1. Your group will prepare an oral presentation using digital capacities, such as prezi, which should include visual elements such as pictures, videos, and/or animations. Videos should be less than 1 min.
2. The duration of the presentation will be 12 min, followed by 3 min for Q&A.
3. All members of the group must participate in the oral presentation.
4. Remember, your slides should communicate general ideas, not details.
5. Practice your presentation in order to make sure any links, videos or animations work properly. A) Has the presentation covered the key points of the project: the fundamental premises, the questions or problem investigated and the hypothesis

Content of presentations:

Your slides should include all the following information (with minimum amount of text in the slides).

a. Title slide with name of project, course and presenters.
Followed by slide(s)
b. Stating question or problem
c. Giving some background information
d. Describing overall approach used to address questions
e. Methods: do not give details here, just a general description of the methods used
f. Results (make sure you present the data in a concise way, don't present tables full of numbers, instead, use photos, graphs or figures to communicate the idea).
g. Conclusions (include here what you have learned -see guidelines for your discussion in assignment #4-)
h. Acknowledgments

Evaluation:

Presentations will be evaluated on the following aspects:
A) Has it proposed experimental approaches to answer the questions (ie, the methods), the data and the conclusions?
B) Is the talk well organized, does it follow a logical sequence, are connections made between different ideas and results?
C) Have the presenters spoken clearly, demonstrating a full understanding of the principals involved?
D) Do illustrations, pictures, figures and other audio-visuals enhance the audience's understanding of the topic.