New Course Request

Indiana University

South Bend Campus

Check Appropriate Boxes:
Undergraduate credit [ ] Graduate credit [ ] Professional credit [ ]

1. School/Division: College Liberal Arts & Sciences
2. Academic Subject Code: Biol
3. Course Number: L342 (must be cleared with University Enrollment Services)
4. Instructor: Biology Faculty
5. Course Title: Tropical Marine Biology Field Course
   Recommended Abbreviation (Optional): (Limited to 32 Characters including spaces)

  _______ 6. First time this course is to be offered (Semester/Year): Spring 2008

  _______ 7. Credit Hours: Fixed at 3 or Variable from ______ to ______

  _______ 8. Is this course to be graded S-F (only)? Yes [ ] No [X]

  _______ 9. Is variable title approval being requested? Yes [ ] No [X]

10. Course description (not to exceed 50 words) for Bulletin publication:
    P or concurrent: BIOL-L304,
    Tropical marine ecosystems will be examined in detail during ten day trip to
    field sites in the Caribbean or Central America.

11. Lecture Contact Hours: Fixed at 0 or Variable from ______ to ______

12. Non-Lecture Contact Hours: Fixed at 3 or Variable from ______ to ______

13. Estimated enrollment: 20 of which 0 percent are expected to be graduate students.

14. Frequency of scheduling: every years. Will this course be required for majors? [ ]

15. Justification for new course: submission is supported as a Marine Science course.

16. Are the necessary reading materials currently available in the appropriate library? [ ]

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: [Signature] Date 3/10/07
Department Chairman/Division Director

Approved by: [Signature] Date 4/30/07
Dean

Date ______
Dean of Graduate School (when required)

Date ______
Chancellor/Vice-President

Date ______
University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 724
University Enrollment Services Final—White; Chancellor/Vice-President—Blue; School/Division—Yellow;
Department/Division—Pink; University Enrollment Services Advance—White
Physical Demands of the Course

Like all field work at any location, this course will be physically demanding in many ways, and because it will be conducted in Belize there will be the additional stresses that come with being away from familiar surroundings. While this is not an exhaustive list, you should be aware of all of the following:

- You must be able to hear, understand and follow verbal directions given to you under a variety of circumstances, including while you are in the water, while on the boat, and while walking or hiking in a variety of terrestrial environments.

- You must be capable of sustained physical activity for 2-3 hours at a time, multiple times per day each day that we're in Belize.

- You must be able to swim well enough to pass the swim test, and you should be prepared for the fact that you will be spending several hours in the water every day.

- Travel to and from the various snorkeling sites will be by boat, and although the sites we'll visit are protected by a barrier reef, there is always the possibility of choppy surf and seasickness.

- Because you will be spending the majority of every day outdoors, you should be prepared for extensive sun exposure and the consequent risk of sunburn, the potential for insect bites or stings, and the need to consume ample amounts of water to avoid dehydration. Belize is in the tropics, so it will be both hot and humid.

- You should anticipate walking at least two miles each day, carrying your snorkeling gear and/or other equipment. Much of this walking will be on uneven surfaces, such as the rocky intertidal, the mangroves, and sand at the beach. You should also anticipate carrying your own luggage at all times.

- Other than the main roads, most roads on Ambergris Caye are unpaved dirt, which again provides an uneven and potentially unstable footing.

- At the Mayan ruins in Lamanai you should anticipate hiking on jungle trails which may be muddy, slippery, uneven, and/or up or down hills. If you wish to climb the ruins, the stairs will be steep, carved from stone, potentially slippery, and will not have hand rails.

- Food will be prepared at the TREC compound and will be safe and healthy, however, it may be different from the foods you are accustomed to eating at home. Consequently, you should be aware of the potential for mild stomach upsets.

- You may find being in a different culture, largely surrounded by people who look, think and act differently from you, a stressful experience, and you should realize that you may become homesick. Some class activities, especially those that involve being in the water at night, may induce anxiety.
Helpful Information and a Few Rules

We will be departing at 7:00 AM on Saturday, May 6th. As this is the first leg of an international flight, airline regulations require that you be at the airport at least 2 hours BEFORE the flight leaves - that means 5:00 AM. Take this seriously - if you aren't there, the airline can refuse to let you on the plane. If you want to go, DO NOT BE LATE!!

The itinerary is shown on your ticket receipt, but I've reproduced it here for those of you who need to copy it to leave it with someone:

Saturday, May 6th
Delta #6384  depart South Bend 7:03 AM  arrive Atlanta 8:59 AM
Delta #271  depart Atlanta 12:59 PM  arrive Belize City 2:01 PM

Saturday, May 13th
Delta #270  depart Belize City 3:11 PM  arrive Atlanta 8:09 PM
Delta #6367  depart Atlanta 9:30 PM  arrive South Bend 11:21 PM

We will be staying at
Belize Tropical Research and Education Center (TREC)
Grouper Street
San Pedro, Ambergris Caye

Keep this information with you - you'll need it to fill out the Customs and Immigration form, called a "Landing Card", that the flight attendant will distribute on the plane when we get close to landing in Belize.

The phone number at TREC is 011-501-226-3389. Belize is in the Central Time Zone and does not observe Daylight Savings Time, which means that its 2 hours earlier in Belize than it is here in Indiana. If someone needs to reach you, the best time for them to call is between 7:30 and 8:00 AM or 6:00 and 7:00 PM (Belize time), when we'll be at breakfast or dinner and thus most likely to actually be there. Phone calls from the US to Belize are moderately expensive and should be limited to urgent/emergency situations. Phone calls from Belize to the US are extremely expensive and should be avoided if at all possible. Your cell phone probably will not work in Belize, and should be left at home. Do not expect to have Internet/e-mail access while in Belize; there are cybercafes in San Pedro, but you probably won't have time to go to them.

You are allowed one piece of luggage of any size, that you will check (give to the airline at South Bend and reclaim in Belize City); this is limited to no more than 50 pounds or you will have to pay "excess weight" charges. We may give you a second bag, full of equipment, to check as well, or we may give you pieces of equipment (such as the underwater spotlights) to put in your personal luggage. You are also permitted one carry-on bag (maximum dimension 19 inches) and one "small personal item", such as a purse, belt bag, or briefcase. Please note that the backpacks many of you carry and large shoulder totes will be considered as carry-on luggage and not as a "small personal item". One member of each group will need to carry a briefcase/shoulder bag we'll give you, containing the laptop computer that their group will use, as their "small personal item".
Remember that this is the tropics and pack accordingly. It will be warm (expect an average high temperature of ~80°F) and humid; it may rain. Belize is a relatively conservative country; while shorts and a swim suit will be fine for around the hotel, for times when we go out in public you will need something more modest (walking shorts and a T-shirt will be fine). Extremely short shorts or skirts and revealing tops are not appropriate and will get you attention you don't want.

Do not bring anything you would be heart-broken to come home without. This includes expensive camera equipment, jewelry, family photos in your wallet, etc. The hotel has a safe, but the safest place for your valuables is at home.

Plan to bring some spending money - you'll want to be able to buy souvenirs, lunch on our last day, etc. You should be able to get a cash advance with an ATM card or credit card in San Pedro, but bring at least $50 in US cash with you - you'll need to be able to pay the "departure tax" in cash whether or not you've been able to access your accounts.

Please pack the following items in a bag you will keep with you on the plane:
- Your passport, your plane ticket receipt, and TREC's address
- Waterproof sunblock
- A swim suit, your mask and snorkel (fins won't fit in most carry-on bags)
- A spare set of clothes
- Any medication or other toiletries you can't live without
- Your glasses/contacts/whatever (if applicable)
- Your camera if you are bringing one, and all your film

DO NOT PACK OR CARRY anything the airport security people could possibly consider a weapon - this includes dive knives, scissors, nail files, razors, pocket knives, corkscrews and any other sharp objects - in your carry-on luggage. If a guard finds such an item in your carry-on bag (or your pockets), it will be confiscated. If you try to protest, you may be arrested as a possible terrorist.

Keep all medications, both prescription and over-the-counter (aspirin, Dramamine, etc.), in their original containers, and bring a copy of your prescription with you if you are bringing any prescription drugs. Our return flight from Belize may be met by DEA agents and/or drug-sniffing dogs, and you don't want there to be any question about what those pills in your bag are.

You are allowed to bring goods valued at up to $800 back into the US without paying any import duty (taxes) on them; this should exceed the acquisitiveness of even the most avid shopper. If you are over 21, this can include up to one liter of alcohol (basically, a bottle of something). Do NOT attempt to bring any of the following back into the US: drugs (other than ones you took with you in the first place - see above), unprocessed agricultural products such as fruits or vegetables (canned foods and roasted coffee beans are fine), live plants or animals, or anything made from an endangered species (such as a sea turtle or black coral). If you are caught, you will face extremely large fines or jail time or both.
A Few Rules To Live By

We want you to have a good time in Belize. We also want to come back with everybody we went down with, and without either of the instructors having suffered a nervous breakdown. To help make all of these things possible, we ask that you obey the following rules:

1) Do not leave the TREC/hotel compound after dark except on class or group outings. While San Pedro is relatively safe, you are very well off relative to the average Belizean, and there's always the possibility that someone will decide to do a little impromptu redistribution of wealth.

2) If you need to leave the TREC compound during the day (such as to go into town to buy more Dramamine), you must do the following:
   • Tell one of the instructors where you are going and when you expect to be back.
   • Take someone with you, preferably an instructor, and one of the walkie-talkies.
   • Upon your return, find the same instructor and tell him or her that you are back - otherwise, we may come looking for you.

3) Stay with your swim buddy at all times when you are in the water. If your buddy decides he or she wants to go back to the boat, swim back with him/her, and then either recruit someone off the boat to be your new buddy or join the nearest pair (at which point you'll have 2 buddies to keep track of, and both of whom will be keeping track of you). "Staying with" your swim buddy means being able to see him/her well enough to determine that he/she is okay; knowing that your buddy is that faint purple blur on the horizon isn't good enough. You don't have to have the same swim buddy every time we go out, and you don't have to have someone else from your project group as your swim buddy - find someone who likes to move at about the same pace as you, and buddy up with them.

4) Just Say No. If you buy drugs in Belize, the person who sells them to you will probably turn you in to the police and you will be arrested. If you are arrested, we will call the person you listed as your emergency contact, and we will give you the phone number for the American Embassy in Belize City. Then we will come home, leaving you behind in a Belize jail. Don't do it.

5) Do not invite Belizeans (or anyone else) you meet back to your hotel room; the garden or the pool at the hotel is an excellent place for entertaining new friends. Again, you are quite wealthy relative to most Belizeans, and you don't want to be flaunting how much you have and tempting someone to help themselves to your possessions. AIDS is rampant in many parts of Central America, so for the sake of your health, please limit your interactions with the locals to activities that can be conducted in public places.
Project Proposal Guidelines

Project proposals are due on or before Sunday, March 26th, 2006; late proposals will lose 5% each day after the due date.

Research proposals are similar to other types of scientific writing in that the statements you make must be supported by relevant scientific literature, and the proposals must follow very specific instructions regarding organization and formatting. However, in contrast to a research paper or lab report, a proposal has as its main objective to convince someone in writing that your project is worth doing. Project proposals are usually written as "grant proposals", in which you are trying to convince some funding agency to give you money to support a project (pay your salary, buy the necessary reagents and equipment, etc). Each funding agency has its own specific format it wants you to use, but all proposals have two main parts: a review of the relevant scientific literature and a description of the proposed research. Your proposal should follow this basic structure, as outlines below.

Format and General Instructions

Proposals should be typed or word processed in a 12-point font, single-spaced with 1 inch margins on 8.5 x 11 inch paper. Number the pages. Section and subsection titles should occupy a separate line and be in bold type. All organisms should be identified by genus and species (which should be italicized, as the names will be in Latin) the first time they are referred to; subsequently the genus can be abbreviated (the cnidarian *Hydra vulgaris* can be referred to as *H. vulgaris* after it has been initially spelled out). References should be cited as described in the Research Paper Instructions handout.

Project proposals are **strictly limited to a maximum of 3 pages**, excluding References list and the appendix in which you list all necessary supplies, materials and equipment. Therefore, your writing must be concise and succinct.

Your proposal should contain the following, in this order:

- **Title of project** - at the top of the first page, in **bold** type.

- **Authors** - list all group members, alphabetically by last name. All group members are expected to contribute to developing the project proposal. This should appear on the line immediately below the title.

- **Background and Significance** - the first major section heading in your proposal. In this section you should provide the general background that will provide context for the work you propose to do, and introduce the system you'll be working in. This is also the section in which you introduce the general questions you'll be attempting to answer or the hypotheses you'll be testing, and justify their importance in the broader field of marine biology. All factual statements should be supported by references from the scientific literature.
• **Specific Aims and Methods** - the other major section of your proposal. Here you explain exactly what it is you propose to do and how you plan to do it. Outline the proposed experiments, including the appropriate controls, and explain how these experiments will help you answer the questions or test the hypotheses you've already introduced. Again, cite your sources from the scientific literature indicating where you got ideas for experimental design, as well as supporting your claims that these are the appropriate type(s) of experiments to perform.

• **References** - a complete list of all references cited in your proposal, formatted as described in the Research Paper Instructions handout.

• **Appendix - Supplies and Equipment**. A complete list of everything you will need to complete this project. Please consult with your project's faculty mentor when compiling this list.

**Questions to consider while writing your proposal**

• What is/are the specific question(s) being asked?
• How does the proposed project address the question(s)?
• What are the controls for each experiment? Are these controls sufficient to allow you to interpret all the possible outcomes of the experiment?
• What contribution will this project's results make toward answering the questions under consideration?
Peer Evaluation of Group Project Participation

In theory, each member of your group should have participated equally in all aspects of your group project, from designing the project and developing the proposal, through conducting the actual experiments and analyzing the data, to preparing your presentation and writing the paper. In practice, for a variety of reasons, some people in a group may contribute more than others. Because of this, we have developed this system by which each member of a group evaluates his or her own contribution to the group and the contribution of each other member of the group. This evaluation will be kept completely confidential - no-one in your group will know what score you gave yourself or anyone else. The number of points you earn will reflect the average of the score you gave yourself and the score the other members of your group gave you. You must return this form to Dr. Grens, by e-mail or hard copy, by JUNE 9TH, or you will earn no points for this assignment, no matter what score your other group members gave you.

Part I: Fill in your name and the names of the other people in your group (first names are fine; please put your name first on the list). Assign each person a score between 0 and 10; a score of 0-4 indicates that in your opinion this person made very little contribution to your group, 5-7 indicates a moderate, reasonable contribution, and 8-10 indicates a major contribution.

Name                      Score

Part II: Answer the questions below explaining why you assigned the scores you gave. Failing to answer these questions conscientiously will lower your score on this assignment by 5 points.

1) What are the reasons for the highest score you gave?

2) What are the reasons for the lowest score you gave?

3) Why do you feel you deserve the score you gave yourself?
Class Collection and Identification Assignment

The indicated numbers of representatives of each of the following taxa are to be identified to genus and species: cnidarians, ctenophores, cephalopods, fish, large plants and all organisms observed in Hol Chan National Marine Reserve are NOT to be collected and should be identified in situ or from digital photos, while other organisms can be brought onto the boat long enough to key them out. Please note that all organisms must be returned to the site from which they were collected before we leave that site. A card giving the scientific classification of the organism (Phylum or Division, Class, Order and/or Family, Genus and Species) and the name of the person who identified it should be filled out and returned to the Species Identification Binder. The identification should be independently verified by a second person, and that person should also sign his or her name to the card.

Because "species identification" represents a portion of your grade in this course, each person must perform his or her share of the identifications. To prevent enthusiastic members of the class from excluding others from their share of the identifications, please observe the following limits: you may sign a maximum of 18 cards as the first person to identify an organism, and you may sign a maximum of 20 cards as the second person, who verified an identification. While we encourage you to continue to key out additional organisms for your own information, you may not continue to sign cards beyond these limits. Each person must provide the primary identification of at least 12 organisms and must verify at least 12 additional organisms.

Organisms for the open-book species identification practical will be drawn primarily, but not necessarily entirely, from those previously identified. However, any group of organisms that appears to be particularly poorly represented in the class collection will be located by the instructors and added to the ones to be identified during the practical.

Kingdom Plantae - 24 species
Division Chlorophyta
Division Phaeophyta
Division Rhodophyta
Division Anthophyta
  Mangroves
  Sea grass
  Other plants

Kingdom Animalia - 83 species
Phylum Porifera
  Class Demospongaie
Phylum Cnidaria
  Class Hydrozoa
  Class Scyphozoa
Class Cubozoa
Class Anthozoa
  Subclass Alcyonaria  2 species
  Subclass Zooantharia
    Order Actinaria  4 species
    Order Scleractinea  6 species

Phylum Ctenophora  1 species

Phylum Mollusca
  Class Polyplacophora  2 species
  Class Gastropoda  13 species
    (must include at least one member of Subclass Opisthobranchia
    and at least one member of Subclass Prosobranchia)
  Class Bivalvia  2 species
  Class Cephalopoda  2 species

Phylum Annelida
  Class Polychaeta  4 species

Phylum Arthropoda, Subphylum Mandibulata, Class Crustacea
  Subclass Malacostraca
    Order Amphipoda  2 species
    Order Isopoda  1 species
    Order Decapoda  8 species
  Subclass Maxillopoda
    Order Cirripedia  2 species

Phylum Echinodermata
  Class Asteroidea  3 species
  Class Ophiuroidea  2 species
  Class Holothuroidea  3 species
  Class Echinoidea  7 species

Phylum Chordata
  Subphylum Urochordata  3 species
  Subphylum Craniata
    Class Chonrichthyes  3 species
    Class Amphibia  2 species
    Class Reptilia  3 species
      do NOT pick up/collect any snakes - but if you find one, DO get
      Dr. Grens so she can see it
L391 - TROPICAL MARINE BIOLOGY FIELD STUDY
Spring 2006 (class #23336)

Instructors:
Dr. Peter Bushnell  Dr. Ann Grens
136 Northside 128A Northside
520-4888 520-4426
pbushnel@iusb.edu agrens@iusb.edu

Required texts: Peterson Field Guide to Coral Reefs of the Carribean and Florida
Peterson Field Guide to Southeastern and Carribean Seashores
both by Eugene Kaplan

Optional text: Fishwatchers Guide to West Atlantic Coral Reefs, by Charles Chapman
This book is printed on laminated paper and can be taken in the water.

Equipment: see list

Tentative Schedule for Spring 06 Semester

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Activity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun.</td>
<td>29 Jan</td>
<td>Introductions, course overview</td>
<td>Northside 154</td>
</tr>
<tr>
<td>Wed.</td>
<td>1 Feb</td>
<td><strong>First payment due ($500)</strong></td>
<td></td>
</tr>
<tr>
<td>Sun.</td>
<td>12 Feb</td>
<td>Set up groups, choose group project topics</td>
<td>Northside 154</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invertebrate ID lab #1</td>
<td></td>
</tr>
<tr>
<td>Wed.</td>
<td>1 March</td>
<td><strong>Second payment due ($500)</strong></td>
<td></td>
</tr>
<tr>
<td>Sun.</td>
<td>12 March</td>
<td>Paper presentations for group projects</td>
<td>Northside 154</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fish and invertebrates CD distributed</td>
<td></td>
</tr>
<tr>
<td>Sun.</td>
<td>26 March</td>
<td>Invertebrate ID lab #2</td>
<td>Northside 154</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Project proposals due</strong></td>
<td></td>
</tr>
<tr>
<td>Sat.</td>
<td>1 April</td>
<td><strong>Final Payment due (~$650)</strong></td>
<td></td>
</tr>
<tr>
<td>Sun.</td>
<td>9 April</td>
<td>Passport required*</td>
<td>Northside 154</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practice fish and invertebrates quiz</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water chemistry lab</td>
<td></td>
</tr>
<tr>
<td>Sun.</td>
<td>30 April</td>
<td>Final check, distribute plane tickets</td>
<td>Northside 154</td>
</tr>
<tr>
<td>Sat.</td>
<td>6 May</td>
<td>Leave for Belize</td>
<td>South Bend airport</td>
</tr>
<tr>
<td>Fri.</td>
<td>2 June</td>
<td><strong>Project papers due</strong></td>
<td>Dr. Grens' office</td>
</tr>
</tbody>
</table>

* Bring your passport to this class meeting so we can make a copy of it.
Tentative Schedule of Activities in Belize

<table>
<thead>
<tr>
<th>Date</th>
<th>Morning</th>
<th>Afternoon</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday 5/6</td>
<td>Leave for Belize</td>
<td>Arrive Belize</td>
<td>Intro to Belize</td>
</tr>
<tr>
<td>Sunday 5/7</td>
<td>Reef snorkel</td>
<td>Hol Chan snorkel</td>
<td>Practice invertebrates quiz</td>
</tr>
<tr>
<td></td>
<td>Invertebrate collection and identification¹</td>
<td>Invertebrate collection and identification¹</td>
<td>Project descriptions</td>
</tr>
<tr>
<td>Monday 5/8</td>
<td>Shark/ray alley</td>
<td>Urchin project²/grass beds</td>
<td>Fish Quiz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reef snorkel</td>
<td>Invertebrates Quiz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Night seining</td>
</tr>
<tr>
<td>Tuesday 5/9</td>
<td>Lamanai (tropical rainforest and Mayan ruin)</td>
<td>Lamanai</td>
<td>Night snorkel</td>
</tr>
<tr>
<td>Wednesday 5/10</td>
<td>Reef projects²</td>
<td>Rocky Intertidal</td>
<td>Barbeque in town</td>
</tr>
<tr>
<td></td>
<td>Invertebrate collection and identification¹</td>
<td>Invertebrate collection and identification¹</td>
<td></td>
</tr>
<tr>
<td>Thursday 5/11</td>
<td>Mangroves</td>
<td>Work on projects</td>
<td>Project presentations</td>
</tr>
<tr>
<td>Friday 5/12</td>
<td>Species ID Practical</td>
<td>Last chance snorkel</td>
<td>End of trip party</td>
</tr>
<tr>
<td>Saturday 5/13</td>
<td>Belize Zoo</td>
<td>Leave Belize</td>
<td>Arrive South Bend</td>
</tr>
</tbody>
</table>

Please note that all activities in Belize are weather permitting, and the schedule will be adjusted as necessary to accommodate inclement weather.

¹A list will be provided of ~100 representative organisms that are to be collected and identified by the class as a whole. Each person will be responsible for identifying his or her share of the organisms collected (the precise number will be provided with the list, at the 9 April class meeting), and will be expected to become familiar with the use of field guides and dichotomous keys. A species identification practical will be used to assess your proficiency, in which you will be presented with ~10-15 organisms and the appropriate guides and keys and asked to identify the organisms.

²Projects will be partially defined by the instructors and will be chosen by random drawing at the second class meeting. All members of the class will participate in data collection for all projects, but one group will be responsible for designing each project, interpreting the data collected, and presenting the results and conclusions both in an oral presentation in Jamaica and in a formal written report. Additional information, including instructions for the preparation of project proposals and papers, will be distributed at the second class meeting.
**Grading:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance and enthusiastic participation</td>
<td>40%</td>
</tr>
<tr>
<td>Group project</td>
<td>40%</td>
</tr>
<tr>
<td>Reference paper presentation</td>
<td>5%</td>
</tr>
<tr>
<td>Project proposal</td>
<td>5%*</td>
</tr>
<tr>
<td>Project presentation (in Belize)</td>
<td>5%</td>
</tr>
<tr>
<td>Paper</td>
<td>20%*</td>
</tr>
<tr>
<td>Group members evaluation</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Species identification</strong></td>
<td>20%</td>
</tr>
<tr>
<td>Class collection and identification</td>
<td>5%</td>
</tr>
<tr>
<td>Invertebrate identification quiz</td>
<td>5%</td>
</tr>
<tr>
<td>Fish identification quiz</td>
<td>5%</td>
</tr>
<tr>
<td>Species identification practical (open book)</td>
<td>5%</td>
</tr>
</tbody>
</table>

*Late proposals or papers will lose 5% of the possible points on that assignment for each day that they are late, and will not be accepted more than one week late.*

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**Equipment - Required**

Passport (if you don't already have a passport, you can get the forms at:
http://travel.state.gov/passport _easy.html) Use your full legal name on your passport, and make sure you give us that name for your airline ticket as well. If the name on the ticket and the name on the passport aren't the same, you won't be able to get on the airplane. It can take 6 weeks to get a passport, so do this now.

Snorkel, mask and fins
Light-weight gloves (cotton garden gloves are fine - you'll want to pick things up under water without getting stabbled, stung, etc)
Swim suits (at least 2; 3 would be better....putting on a wet swim suit is no fun)
Sunscreen - SPF ≥30, waterproof ("Bullfrog Amphibious Sunblock" and "Coppertone Sport" are two that have worked well in the past)
T-shirt or other cover-up to snorkel in (or a Lyera "skinsuit" if you're particularly fair-skinned or likely to be allergic to coral/jellyfish stings)
Shorts and/or lightweight pants (2 or 3)
T-shirts or other light-weight tops (remember, this is the tropics; it's hot and humid)
Flip-flops/Texas/other slip-on footwear to wear around the boat and hotel
Cheap sneakers for the rocky intertidal and slogging to Tidepool Island (NOT your $90 Nikes)
Sturdy footwear for the Mayan ruins
Socks (to wear while hiking; also socks to wear with your fins if you have "pocket" rather than "rocket" style fins and won't be wearing dive boots with your fins)
Sunglasses, hat
Insect repellent
Water bottle or canteen, with a carry strap or belt attachment
Flashlight - preferably waterproof. For night octopus hunt, brushing your teeth if the power goes out, etc. Make sure it has fresh batteries and a working bulb.
4 C-cell batteries (for the underwater spotlights for the night snorkel)
Field guides (see first page - these books are required)
Pens/pencils, notebook, floppy disks, etc
**Equipment - Optional**

Beach towel - the guest cottages provide bath towels only  
Mesh bag (available in dive shops) - great for carrying your snorkeling gear  
Alarm clock - wind-up or battery powered, not plug-in.  
Clothespins - for hanging wet swim suits and towels out to dry  
Ziplock bags - handy for collecting sea shells and keeping sunglasses and other items dry on the boat while you're snorkeling  
Disposable underwater camera - these work surprisingly well and are much less expensive than serious underwater photography rigs  
Seasickness medication, Benadryl, Solarcaine - if appropriate  
Spare glasses or contact lenses if you wear them  
Toiletries - the housing at the field site will provide soap and toilet paper, but you need to bring your own shampoo, toothpaste, etc.  
Prescription medication - please bring any medication you take in the original container from the pharmacy, and bring a typed copy of the prescription with you as well. This will make it easier to get a refill in Belize if necessary, and will make the DEA inspector happy when you re-enter the U.S.  
Spending money - preferably in small bills. US dollars are accepted for most transactions, and can be converted into Belize dollars in san Pedro as needed, but you may not get change for US dollars in US currency. Unless you want a lot of Belize dollars, don't plan on buying a $2 trinket with a $20 bill. The Belize dollar is fixed to the US dollar at a rate of BZ$2 = US$1.

Airline regulations allow ONE carry-on bag and two checked bags per person. We may be giving you one suitcase of equipment to check, so please pack everything you are bringing in one bag to check and one bag small enough to meet carry-on restrictions. Please pack your mask and snorkel and one swim suit in your carry-on bag, so that you can go snorkeling on Saturday even if the airline misdirects your checked bag. **DO NOT** pack anything the airport security guards might possibly consider to be a weapon in your carry-on bag; this includes dive knives, razors, pocket knives, corkscrews and any other sharp objects. If a guard finds such an item in your carry-on bag (or your pockets), it **will** be confiscated. As with any travel, do not bring anything that you would be heartbroken to come home without. While security at the hotel is quite good, a trip like this one creates a multitude of opportunities for you to forget or lose something you brought with you.
Withdrawals and Incompletes

The last day to withdraw from this course and receive a grade of "W" is Monday March 27th; if you wish to withdraw, all paperwork must be signed and submitted to the Registrar's Office by 5:00 p.m. on this date. After that time, in order to withdraw you must present an "urgent and compelling reason" for withdrawing to the Dean of the College of Liberal Arts and Sciences. Please note that College policy explicitly states that poor performance (i.e. a low grade) does not constitute an "urgent and compelling" reason and requests to withdraw for that reason are routinely denied. Please also note that after February 1st, you will not receive a full refund of all the money you have deposited, as by that time we will have made non-refundable deposits based on the understanding that you would be participating in all aspects of the course. Once we have a purchased an airline ticket in your name, the ticket is non-refundable but can be exchanged for a ticket to a different destination on a different date once you pay a "change fee" to the airline.

The College also has a firm policy on the issuance of a grade of "I" (Incomplete). To receive an Incomplete in this course, you must have completed 75% of the course work and have a passing grade in the course at the time that you request a grade of "I". You must present evidence of circumstances of hardship, under which it would be unjust to hold a student to the time limits ordinarily fixed for completion of the course work" when you request the "Incomplete". At the time an "Incomplete" is issued an agreement will be reached as to what is required in order for you to complete the course and the time limit within which you must complete the work. Please note that any grade of "I" not completed within one year of issuance will automatically be changed to an "F" by the Registrar's Office.

Cheating and Plagiarism

Cases of cheating or plagiarism will be dealt with as described in the Indiana University Academic Handbook and the Code of Student Rights, Responsibilities and Conduct. Cheating includes but is not limited to the use of unauthorized materials or assistance during a quiz or exam, deliberate efforts to obtain information from other students during a quiz or exam (with or without the knowledge or consent of the other students), and possession of a quiz or exam in advance of the scheduled exam period. If you are caught cheating on an exam, you will receive a grade of "F" for the course and the incident will reported to the Vice Chancellor for Student Affairs for notation in your permanent academic record.

While you are welcome to study together and to discuss outside assignments, each student is expected to complete his or her own work; submission of a copy of someone else's homework is cheating, just as is copying someone else's answers on an exam. Indications of violation of this policy, such as the submission of identical work by two or more students, may result in a score of 0 for the assignment and may, in the case of repeated violations, result in a grade of "F" for the course.

Plagiarism is any submission of written work that is not your own without proper documentation of your sources; this includes but is not limited to submission of the work of another author as your own, submission of information obtained from the Internet without citation of your sources, and submission of work containing text or content/ideas from any other source without citation of those sources. Please note that citing a source is NOT a license to lift text or quote passages verbatim - all written work you submit must be in your own words. Please also note that using an idea that you did not originate without citation is plagiarism just as much as using text written by someone else is, and is in some ways a worse violation of
intellectual property rights. If you are found to have plagiarized any assignment, from any source, you will receive a grade of "F" for the assignment, may receive a grade of "F" for the course, and the incident will reported to the Vice Chancellor for Student Affairs for notation in your permanent academic record. ALL WORK SUBMITTED MUST BE YOUR OWN!

Accommodation

If you have a disability and need assistance, arrangements can be made to accommodate many needs. Please contact the Office of Disabled Student Services (520-4832, Admin 149) as soon as possible to work out the details. Before we can make any arrangements for you, we will need to receive official documentation of your disability and the appropriate accommodations from this office.

Please note that in order to participate in this course you must be capable of passing the swim test and able to participate in other physically challenging outdoor activities. If you anticipate that you may be unable to complete a substantial fraction of the course activities, this is not an appropriate class for you; please consult with your academic advisor to withdraw from this course. See the "Physical Demands of the Course" handout for additional information about what exactly will be expected of you.
Grading Rubric for Presentations

On a scale of 1 to 10, indicate how strongly you agree with each of the following statements (1 = strongly disagree, 5 = neutral, 10 = strongly agree):

1) The hypothesis to be tested or question to be answered was clearly presented and explained.

2) The relevant background information was clearly and succinctly presented.

3) The experimental methods were clearly explained.

4) The experimental rationale was clear - it was clear why this was the best way to answer the question or test the hypothesis.

5) The outcome of the experiments was clearly summarized.

6) The figures were accurate and easy to read, and made it easier to understand the data.

7) Plausible explanations were provided for differences between observed and expected results.

8) The conclusions drawn were supported by the experimental data.

9) The relationship between this group's findings and other information on the subject in the literature was presented clearly and discussed.

10) All group members were knowledgable about the subject and participated in all aspects of the project.
Research Paper Instructions and Comments

Scientists communicate primarily via articles in peer-reviewed journals; other mechanisms for presenting results of research to the scientific community, such as presentations at conferences and invited talks, reach a very small fraction of the worldwide body of those potentially interested in particular field or topic. Consequently, learning to write well in the accepted manner for scientific publications is an essential part of your training as a biologist. Realize that each field in biology has its own specific style and format requirements, which may differ from the ones given here, so you should always read the "Instructions to Authors" carefully and follow them precisely. The instructions on style and format given here should be rigorously followed in preparing your paper on your group project for this course - we will be as picky about them as editors of scientific journals are about the style requirements for their journals.

General comments and helpful suggestions

Get started early. Write in complete, grammatically correct sentences and concise, logically organized paragraphs. Proofread and spell-check your final manuscript, and have someone else read it for you, to catch the errors you miss. If you need assistance with the mechanics of writing, see the Writing Center or the Academic Resource Center. Do not be wordy, redundant or repetitive. Do not use colloquialisms, jargon, contractions or parenthetical statements. Do not write in the first person. Organize your text in a logical, internally consistent manner.

Preparation of the manuscript

Papers should be typed or word processed in a 12-point font, 1.5-spaced with 1 inch margins on 8.5 x 11 inch paper. Number all pages except the title page (which is counted as page 1 but does not have a page number on it). Section and subsection titles should occupy a separate line and be in bold type. All organisms should be identified by genus and species (which should be italicized, as the names will be in Latin) the first time they are referred to; subsequently the genus can be abbreviated (the cnidarian Hydra vulgaris can be referred to as H. vulgaris after it has been initially spelled out). Figures should be numbered consecutively in order of appearance. Every figure should have a title and a brief figure legend describing the experiment immediately adjacent to it (underneath or to the side depending on the size and shape of the figure). Tables should be numbered consecutively in order of appearance, and each table should have a brief descriptive title above it and an explanatory legend below it.

Be very careful that you cite your references. Any time you take an idea or a result from somewhere else in the literature, you need to cite or reference the original author(s). References are cited for two reasons: to tell the reader where to look for further information, and to give credit for the origination of an idea or a result to the person/people who actually did the work. If you don't reference your sources, you are basically stealing someone else's ideas and/or data and passing them off as your own. Failing to give adequate citation is plagiarism, which is both unethical and illegal. If you aren't certain whether or not to cite a reference for something - cite it! Please note
that citing a source is NOT a license to lift text verbatim from that source, and that direct quotes, even with attribution, are not appropriate in scientific writing. Footnotes are also not acceptable in scientific writing - all information should be included in the main body of the text, and references should be cited as shown below.

**Parts of a Scientific Paper**
1) Title page
2) Abstract
3) Introduction
4) Materials and Methods
5) Results and Discussion
6) Summary and Conclusions
7) References

**Title Page**
This is largely self-explanatory - it's the page with the title on it. The title should accurately reflect the subject matter and content of the paper in one reasonably concise sentence. All the authors should be listed on the title page, in alphabetical order (by last name).

**Abstract**
An abstract is a one-paragraph summary of your paper, in which you tell the reader very briefly what you did and what you discovered. In the scientific literature, a reader will read this and decide whether or not to bother reading the actual paper. Be extremely concise in the abstract; it's just a "hint of things to come", not a paper in its own right. Most scientists write the abstract last, after writing the rest of the paper, and construct it by summarizing each section of the manuscript into one or two sentences.

**Introduction**
The introduction should provide the background information that the reader will need to understand your paper and some context for the work you've done. For instance, if your project was on gastropod species diversity in various intertidal environments, you would need to both briefly explain the different intertidal zones and introduce the various species whose distributions you examined. You would also want to tell the reader what is already known about species diversity in the intertidal, to provide context for the information your project collected. Toward the end of the introduction you should tell the reader what question(s) you set out to answer and very briefly describe what you did and what the answer(s) was/were.

The background material will of course be drawn from other sources, such as books and articles in the scientific literature. Cite all your sources! **All the material from your sources must be summarized or paraphrased in your own words** - citing a reference is NOT a license to lift text verbatim from another author's work. Direct quotes in any form are also not acceptable.
Materials and Methods

This section should be written in text paragraphs, not as a list of instructions. You need to give the reader all the relevant information so that he or she can reproduce your experiment, without describing irrelevant details. For example, in a gastropod diversity paper, you need to explain how you surveyed the area (did you look at every single gastropod in the entire study area, every one in randomly selected sub-areas, the first 50 individuals you came to, ?) and which types of analyses you performed on the resulting raw data. You would not need to tell the reader how you recorded the data (on waterproof slates as opposed to in notebooks, for instance). Whenever you work with any living organism, be sure you explicitly tell the reader the genus and species you were using, as results can vary widely if the same experiment is performed on two different species. You also need to give the precise location of the study, as different populations of the same species may lead to different results, and the dates and times when the data was collected. Remember, this is marine biology, so many results may be critically dependent on this information (would you expect someone who collected data on fish diversity at midnight to see the same fish you observed at noon?). Unless you invented a procedure yourself, you should cite the reference from which you took the procedure. Do not explain or justify why you did one thing rather than another (that goes in the Discussion), simply tell the reader what you actually did.

Results and Discussion

The Results are the heart of any paper - this is where you present your data. As much as possible, put your data into Figures - tables, graphs, drawings, etc. It's much easier for the reader to see your data in a figure than to have it all described in pages and pages of verbiage. This doesn't mean you don't need to write about your data, though; once you've made a figure to present your data, than lead your reader through it ("As shown in Table 2, Charonia were far more abundant on Tidepool Island than at the Reader's Point site, while..."). As a general rule, don't present the raw data; i.e., don't give a list of how many of each species you found in each individual tidepool - summarize the data in a table or histogram.

Some data is largely descriptive, but again, figures, here meaning pictures/sketches or tables, are preferable to long-winded descriptions of your observations. One of the quickest ways to have a paper rejected by a scientific journal is to have a reviewer call it "too descriptive".

Each figure should have a number (number them consecutively in the order in which they are first mentioned in the text), a brief descriptive title, and a legend in which you tell the reader what he or she is looking at. Don't repeat the entire Materials and Methods section in your figure legends, but do give the reader enough information to understand the figure without going back to the Materials and Methods. The figure number, title and legend should appear immediately below the figure they refer to.

The Discussion portions of the paper are exactly what the name implies: the sections in which you discuss your results. This is where you tell the reader what you think your data means and how it relates to everything else that is known on the subject. In the Introduction you introduced the reader to the field and also set up one or more questions you were going to address; in the Discussion, integrate your data into the knowledge in the field and explicitly answer the questions you set out to
address (as much as you can - some data don't allow you to draw exact conclusions). This section is where you can "argue" with your reader, explaining why your interpretation of your data is the correct one and why other possible interpretations of the data are incorrect. If your data are ambiguous or inconclusive, this is also where you can explain the various possible interpretations and state which one you favor. You can also attempt to explain why your data may differ from previously observed results.

Since you will be combining the Results and Discussion, divide this section into subsections by topic. For each topic or set of experiments you should first present the data, and then discuss it. Then put a new subheading, indicating that the topic has changed, and begin by describing the data/results from that set of experiments.

Summary and Conclusions
In this section, briefly summarize the main points of each subsection from the Results and Discussion section of your paper. Follow that with some overall conclusions which relate the sum of all your results to the questions you raised in the Introduction and to the general state of knowledge in the field. This is also where you can mention additional experiments that should be done or point out new questions that are raised by your findings.

References
One more time - cite your source(s) for any idea or data that isn't your own invention or discovery.

Citation of references in the text:
References should be cited in the text (not in footnotes) by the last name of the first author and date (year) of publication; for papers with only two authors give the last names of both authors, but for papers with three or more authors use the first author's name followed by et al., as shown in the following examples:

"...while Marr and Schnabel (1999) have shown that..."
"Alcohol has been shown to negatively affect swimming ability (Bushnell, et al., 1998)."
"Recent work by Schnabel (2001) has expanded the conclusions of Bushnell and Duff (1997) to include...."
"...as demonstrated by Grens and coworkers (2000), expression..."
"...in the 4-day mosquito larva (Clark, et al., 2001a)."

References list:
The list of references should be organized alphabetically by the last name of the first author. For multiple papers with the same first author, list them in chronological order (the oldest paper first, most recent paper last). For multiple papers with the same first author that were published in the same year, cite them in the text as 1995a, 1995b, etc., in order of appearance, and include the "a" and "b" designations in the full citation in
the reference list (see example below). Please format references in the following manner: authors listed by last name and first initials, year in parentheses, title, journal title in italics, journal volume number in bold, first and last page numbers of article. For example:


For references which are papers or chapters in books, provide both the title of the specific chapter or paper you are referring to and the title and editors of the book:


Cross-check your References section with the text of your paper: every reference you cite in the text should appear in the References section, and no references should be in the References section that aren't cited in the text. A "Bibliography", which would also include additional sources that weren't directly utilized in the production of your paper but which contributed to your overall thinking on the topic, is inappropriate in a scientific paper.

**Internet sources and Web sites**

The Internet is a terrific way to find information, but it should not be taken as an actual source of information, as there is no peer review or editorial oversight - anyone can say absolutely anything they want on a web site, with no restrictions on accuracy. Therefore, while we encourage you to use the Web to find references (and many journals are now available on-line as well as in hard copy), you are NOT to cite Internet sources or Web sites as references.

**Specifics:**

- Each group will submit one paper, with all group members listed as co-authors.
  Please submit one hard copy to Dr. Greens and an electronic copy (by e-mail or on a CD), which may be broken up into multiple files if you have difficulty inserting figures into the text document.

- Papers should be ~10-15 pages when typed, 1.5-spaced in 12-point font, including the figures but not including the References list. If you can cover the subject in much less than 10 pages, you either chose too narrow a topic or didn't do a very thorough analysis of your data; if it takes you much more than 15 pages, either you're trying to cover too broad a field or you're being excessively verbose.

- Follow the instructions given for formatting the paper and for citation of references,
both in the text and in the References section, carefully. Failure to do so will cost you points.

- All graphs, histograms and tables should be computer-generated; other figures may be hand drawn if necessary. If you use a photograph or other figure that you didn't generate, cite the source from which you obtained it (for figures downloaded from the Internet, provide the web site address); for artwork, be sure that you credit the artist or photographer in the legend to the figure.

- You must cite at least 8 different references; there is no upper limit to the number of references you may cite. No more than 2 of those references may be review articles or book chapters, the other 6 must be primary articles in which actual data is presented by the people who did the work. Any paper that does not contain both a Materials and Methods section and a Results section is not a primary research article. Articles from the popular press or the Internet, as opposed to the peer-reviewed scientific literature, are not acceptable.

- For each reference that you cite, attach a copy of the first page of the article or chapter at the end of your paper.

All members of a group are expected to contribute equally to the project. Details of how you wish to divide up the work can be decided by the members of the group, but it is exceedingly important that ALL members of the group participate in and contribute to all aspects of the project, and that all members of the group agree that the work has been divided equitably and that each person has done his or her share. You will be asked to rate your own contribution and that of each other group member to the overall project, including development of the project, preparation of the proposal, collection and analysis of the data, and production of the presentation and final paper. The average of the score you give yourself for participation in the group project and the scores you receive from the other members of your group will make up 5% of your total course grade.

**PAPERS ARE DUE IN DR. GRENS' OFFICE,**
**128A NORTHSIDE**
**BY 5:00 PM ON FRIDAY JUNE 2nd.**

Late papers lose 5% of the possible points per day. No paper will be accepted after Friday June 9th except under extremely unusual circumstances.
Water Analysis Lab

The purpose to this lab is to allow you to learn to use some of the equipment you will use in Belize for water sampling and analysis, and to expose you to some of the basic techniques of chemical water analysis that are commonly used in marine biology. Because we will be sampling from a fresh water rather than a marine environment, the organisms you will observe will of course be different from those you will find in your water samples in Jamaica. Most other aspects of this lab, however, will be quite similar to activities you will perform in Belize.

We will collect water samples from the St. Joe river; each pair will be responsible for collecting a water sample and recording the various measurements that must be taken in situ, such as water temperature and dissolved oxygen. You will both measure dissolved oxygen directly with the oxygen meter, and you’ll perform a Winkler titration, which is another method to measure total dissolved oxygen, immediately after collecting the sample (i.e. in the field, to avoid any change in the oxygen content of the sample during storage and transport). We’ll also use the plankton net to collect plankton from the river, and each person will need to identify and count the organisms in their plankton sample.

The following data should be collected in situ at the river, at the time you collect your water sample:
1 - Depth
2 - Dissolved oxygen - measured with the oxygen meter and determined by Winkler titration
3 - Temperature (also measured with oxygen meter)
4 - Turbidity

The following data will be collected after our return to the lab:
5 - Salinity (as this will be 0, each group will also be provided with an Instant Ocean sample to measure salinity with)
6 - Plankton count

**Procedures**

**Depth**
Lower the Secchi disc until the line goes slack and then lift just until it goes taut and you feel the disc lift up off the bottom. Record the depth from the markings on the line. Remember to note the units on the line.

**Turbidity/visibility**
Lower the Secchi disc (the metal disc with the alternating black and white quarters) until you can no longer distinguish the white regions from the black regions. Record the depth on the line attached to the disc.
Using the Water Sampler
1) Slide the messenger (the weight) up the line out of the way.
2) Open end caps and lock in the open position with the locking pins on the top end.
3) Lower the sampler to the desired depth.
4) Release the messenger, which will slide down the line and release the end caps, closing the sampler.
5) Bring the sampler to the surface. Reach in and hold the end caps on by hand as you lift the sampler out of the water - otherwise, the weight of the water will open the end caps and dump the entire sample in your lap.
6) With one person holding the end caps closed, another person should use the release on the bottom end of the sampler to open the flow of water through the tubing and fill the water bottles.

Dissolved Oxygen and Temperature - Oxygen Meter
1) Connect the probe to Dissolved Oxygen (DO) meter if it isn't already connected.
2) Switch to RED LINE and use the knob to adjust the needle until it is on the red line.
3) Switch to ZERO and adjust the needle with the knob if necessary until it is on 0.
4) Calibrate the meter:
   - Insert the probe into a plastic bottle containing a small amount of water, and allow it to equilibrate for a few minutes.
   - Set SALINITY control to "Fresh water".
   - Switch to TEMP and record the temperature
   - Turn the meter over and look at Table 1, printed on the back of the meter.
     Find the temperature you recorded and note the "Solubility" associated with that temperature.
   - Set the meter to the 0-20 scale
   - Use the CALIBRATE knob to adjust the needle so that it indicates the solubility you determined from Table 1.
5) Remove the probe from the plastic bottle.
6) Submerge the probe (not the whole meter!) to the desired depth. Switch to TEMP and read the water temperature.
7) Switch to 0-20 scale.
8) Move probe gently up and down at a constant rate to generate an even flow of water past the membrane on the probe. Allow the needle to stabilize for 15-30 seconds before reading. BE CAREFUL not to damage the probe, and NOTE WHICH SCALE you are using before recording your results in mg O₂/L.

Salinity
Place a drop or two of water on the surface of the refractometer and close the cover, being careful not to trap any bubbles underneath the cover. Hold the refractometer so that sufficient light enters for you to be able to read the scale while keeping the surface containing your sample relatively level. Look through the eyepiece and read the salinity in °/oo from the scale in the ocular field.
Winkler Titration for Dissolved Oxygen

An instruction card is provided with each Winkler titration kit. Carefully read ALL the instructions and comments before beginning the assay.

1) Fill the Sample Bottle using the outflow tube from the water sampler. Allow the bottle to overflow for several volumes, until you are certain that the water in the bottle does not contain introduced oxygen from bubbles or contact with the air. Cap the bottle tightly and save until ready to begin the assay.
2) Add 8 drops of Manganous Sulfate solution and 8 drops of Alkaline Potassium Iodide.
3) Cap the bottle and mix vigorously. A precipitate will form - the oxygen is trapped in the precipitate.
4) Allow the precipitate to settle until it is all in the lower half of the bottle.
5) Add 1 g Sulfamic Acid Powder using the 1 g spoon provided in the kit. Cap the bottle and mix until the precipitate and the powder have completely dissolved. The sample should turn yellow or orange.
6) Transfer 20 ml of the sample to the titration tube (fill to the 20 ml line).
7) Fill the syringe (the "Titrator") with 0.025N Sodium Thiosulfate, and remove any air bubbles by turning the syringe tip up, flicking it until the air bubble rise, and then depressing the plunger to force the air out. Refill the syringe if necessary after removing any air bubbles; it should be completely filled with Sodium Thiosulfate solution.
8) Insert the tip into the cap of the titration tube. Be sure you have a tight seal between the tip and the cap.
9) Slowly inject Sodium Thiosulfate solution into the titration tube, swirling the tube to mix the Sodium Thiosulfate with the water sample. Continue this process until the solution in the tube is pale yellow.
10) Remove the syringe from the cap, and then remove the cap from the titration tube. Add 8 drops of Starch Indicator to the water sample in the titration tube. The solution should turn a dark blue.
11) Replace the cap on the titration tube and re-insert the tip of the syringe into the cap.
12) Continue injecting Sodium Thiosulfate solution one or two drops at a time, swirling well after each addition. The solution will clear and then turn blue again. When the solution remains clear, read the volume of Sodium Thiosulfate solution injected, indicated by the bottom of the plunger on the syringe. This is your Dissolved Oxygen concentration in parts per million (ppm).

Plankton

Attached are two dichotomous keys for the identification of freshwater invertebrates, and additional drawings to assist you in identifying the numerous animals you are likely to find in your plankton sample. Also attached are figures showing common freshwater algae, protists and an assortment of diatoms you may observe. Swirl your sample bottle immediately before removing a sample for analysis, to resuspend and homogeneously mix the organisms. Each person should perform two types of analysis: first, place a 5 ml sample from your plankton tow in a petri dish and observe with a dissecting scope on high magnification. At this level of
Water sample collection site:

Depth sample was taken at:

Visibility:

Temperature:

Dissolved O₂ with Oxygen Meter:

Dissolved O₂ by Winkler Titration:

Below (and on the back if necessary) list the organisms you identified in your plankton sample. Please separate your list into categories (algae, protists, microinvertebrates, macroinvertebrates).
magnification macroinvertebrates such as copepods and Daphnia, a branchiopod, will be clearly visible and readily identifiable. Many algae will also be identifiable in this sample. Second, place a drop of your sample on a clean glass slide. Place a cover slip on either side of the drop, and rest a third cover slip over the water drop on the two flanking cover slips; this prevents microinvertebrates and unicellular organisms from being crushed by the weight of the cover slip. Examine your sample with a compound microscope, beginning with the 4X objective and continuing to the 10X and 40X objectives. When you have identified all the different types of organisms present in that drop, remove and discard the cover slips, wipe the slide dry with a Kimwipe, and repeat the process. Prepare as many slides as necessary until you are no longer finding new organisms when you make a new slide.
INDIANA UNIVERSITY SOUTH BEND

LIBERAL ARTS AND SCIENCES

CURRICULUM CHANGE

(New Course Request & Course Change Request)

ROUTE SHEET

DEPARTMENT AND DIVISION: Biological Sciences/College Liberal Arts & Sciences

CHANGE REQUESTED: Remove *L391, "Special Topics: Tropical Marine Biology Field Course* L342
(This course has been offered every Spring since 2000 as L391.)

SIGNATURES

DEPARTMENT CHAIR

DATE 3/27/07

DIVISION CURRICULUM COMMITTEE CHAIR

DATE 4/26/07

ASSOCIATE DEAN

DATE 4/30/07

SENATE CURRICULUM COMMITTEE CHAIR

DATE 5/24/07

ASSOCIATE VICE CHANCELLOR

ACADEMIC AFFAIRS

DATE