

**OPTION I BIODIVERSITY IN THE LAND OF THE ARAWAKS:  
OR  
OPTION II BIODIVERSITY IN THE LAND OF THE MAKUSHIS:  
Biodiversity and Community Based Ecotourism  
Madewini River (CEIBA Biological Center), Guyana  
or  
Rupununi River (Karanambu Trust), Guyana**

**Faculty: Godfrey R. Bourne, Ph.D. & Karen M. Redden, Ph.D.  
BIOL 4905X & 6905X (3 lab credits) STRUCTURE AND ITINERARY  
1–14 January 2012  
Students fly to Guyana on 1 January 2012**

**Option I**—Document northern Guyana’s biodiversity—flora, fauna, habitats, and ecosystems—for future evaluation of human impacts (community based ecotourism and climate change). Participants travel to CEIBA Biological Center on the Madewini River to evaluate biodiversity in the floodplains of the Madewini from a scientific and journalistic point-of-view to produce a PowerPoint Presentation or PowerPoint Poster in Guyana at CEIBA Biological Center, and a ‘FIELD NOTES’-like article as it appears in National Geographic Research & Exploration Journal with **References**, due on 24 January 2012 (see PDF example). **Each student must study floral and/or faunal taxa.** This course is not for everyone. Participants must be relatively healthy—expect living in close quarters, biting insects, encounters with spiders, snakes, mud, travel in motorized boats, some physical exertion, fascinating biodiversity, and bragging rights. Limited to **3-6 participants** who must bear all travel cost (estimated at \$1,675 + UMSL tuition and technology fees + airfare [estimate] \$1150 + \$100 [cash, spending money]), and have a digital camera, laptop computer, and flash drive with adequate memory.

**Option II**—Document northern Rupununi’s biodiversity—flora, fauna, habitats, and ecosystems—for future evaluation of human impacts (community based ecotourism and climate change). Participants travel to Karanambu Trust on the Rupununi River to evaluate biodiversity in the forests, savannas, and floodplains of the Rupununi from a scientific and journalistic point-of-view to produce a PowerPoint Presentation or PowerPoint Poster in Guyana at Karanambu, and a ‘FIELD NOTES’-like article as it appears in National Geographic Research & Exploration Journal with **References**, due on 24 January 2012 (see PDF example). **Each student must study floral and/or faunal taxa.** This course is not for everyone. Participants must be relatively healthy—expect living in close quarters, biting insects, encounters with spiders, snakes, mud, travel in motorized boats, some physical exertion, fascinating biodiversity, and bragging rights. Limited to **7-15 participants** who must bear all travel cost (estimated at \$1,675 + UMSL tuition and technology fees + airfare [estimate] \$1150 + \$100 [cash, spending money]), and have a digital camera, laptop computer, and flash drive with adequate memory.

During Oct Set up interviews with Bourne by calling his cell **314-709-9134**; 7 Oct registration and \$500 nonrefundable deposit due; for application materials visit [www.umsl.edu/studyabroad](http://www.umsl.edu/studyabroad)  
W 28 Dec Bourne travels to Guyana to oversee logistics for course.  
Su 1 Jan Redden travels to Guyana from Washington DC & **Participants check in St. Louis at 04:00 am** and fly to Miami (MIA) AA **2515** @ 06:05am; **check your luggage** to Georgetown (GEO), Guyana; arrive Miami @ 09:45am; **Check in at 12:00pm** with Caribbean Airlines and fly **BW 483** @ 03:25pm; one stop in Trinidad (POS), connect with **BW 1417** (09:50pm) arrive (GEO) Timehri International Airport @ 10:55pm – You will be met by Bourne for 20 minute drive to CEIBA Biological Center at Madewini; eat snack, get settled in and try to grab some ZZZZs (Day 1)

M 2 Jan	Breakfast @ 7:00am. Orientation @ 09:00am, lunch at Noon, practice censusing techniques 02:00-04:00pm, clean up 04:00-06:00pm, and dinner @ 06:00pm at CEIBA; <b>Karen lectures about the ecological and evolutionary relationships of rainforest flowering plants</b> after this there will be <b>Discussion of Individual Projects Each Night After Dinner</b> , 08:00pm night natural history walk (Day 2)
T 3 Jan	Breakfast @ 7:00am. Initiate biodiversity projects at CEIBA using visual and auditory methods; basics photographic workshop; talk to people about their use of biodiversity (medicines, food, fiber etc), subsistence farming, fishing and hunting, and schooling for their children (Day 3)
<b>T 3 Jan</b>	<b>Under Option II</b> —Breakfast @ 7:00am. Fly to Karanambu, initiate biodiversity projects using visual and auditory methods; basics photographic workshop; talk to people about their use of biodiversity (medicines, food, fiber etc), subsistence farming, fishing and hunting, and schooling for their children (Day 3)
W 4 Jan	Continue projects at CEIBA/Karanambu; after lunch trip to Botanical Garden and National Zoo for photo ops; basics video workshop (Day 4)
Th 5 Jan	Continue research activities at CEIBA/Karanambu (Day 5)
F 6 Jan	Continue research activities at CEIBA/Karanambu (Day 6)
S 7 Jan	Day trip to Kaieteur National Park – continue projects if it has nocturnal aspects (Day 7)
<b>S 7 Jan</b>	<b>Under Option II</b> —There is no day trip to Kaieteur National Park we may get a flyover glimpse on our way to Karanambu on 3 Jan – continue projects at Karanambu (Day 7)
Su 8 Jan	CEIBA/Karanambu – continue projects, and analyze data and prepare project as a PowerPoint Presentation (Day 8)
M 9 Jan	Depart CEIBA for Dubulay Ranch a coastal savanna site continue sampling your taxon(a) to round out your project; – continue to analyze data and prepare project as a PowerPoint Presentation (Day 9)
T 10 Jan	Dubulay Ranch – continue taxon census at Dubulay and continue building PowerPoint Presentation (Day 10)
W 11 Jan	Return to CEIBA in time for Dinner and finish PowerPoints (Day 11)
Th 12 Jan	Wrap-up projects, finish PowerPoint Presentations (Day 12)
<b>Th 12 Jan</b>	<b>Under Option II</b> — Fly to Georgetown, return to CEIBA; finish PowerPoint Presentations (Day 12)
F 13 Jan	Make individual PowerPoint Presentations to entire class (Day 13)
S 14 Jan	Participants return to USA. <b>Check in Georgetown at 03:30am</b> and fly to Trinidad (POS) on BW 1416 @ 05:35am arriving @ 06:40am connecting with BW 484 @ 08:30am, arriving MIA 11:30am. Those returning to STL, you are on AA 583 leaving at 03:00pm (so check in with AA by 1:30pm), arriving STL @ 04:50pm; Bourne shuts down CEIBA (Day 14)
Su 15 Jan	Bourne continues to shut down CEIBA (Day 15)
M 16 Jan	Bourne returns to USA (Day 16)
T 24 Jan	Papers due (electronic submission of Word doc [Compatibility Mode]) to <a href="mailto:bourneg@umsl.edu">bourneg@umsl.edu</a>

***You are required to produce a concise PowerPoint Presentation or PowerPoint Poster of your research project detailing the results of your individual project, and produce a NG-like FIELD NOTES Research and Exploration scientific article, these are due 24 January 2011. PLEASE DO NOT REQUEST DELAYED GRADES. IF YOU DON'T HAVE YOUR US PASSPORT AS YET APPLY AS SOON AS POSSIBLE. APPLICATIONS AVAILABLE AT THE POST OFFICE!***

**YOU BOOK YOUR INTERNATIONAL FLIGHTS! Costs are based on round trip coach from St. Louis estimated at \$1,150. For those not flying out of St. Louis you need to arrive in Guyana on 1 January also. Please connect with Caribbean Airlines (BW 483 leaving MIA @ 03:25pm, this means that you should be in MIA by 12:25pm to easily make your flight).**

### **Disclosure on Plagiarism**

*It is against University of Missouri Policy to cheat or plagiarize by copying directly from books, technical journals, magazines, manuscripts, proposals, blogs, websites, e-mails, or other persons' work without attribution. Copying directly from any source other than your own work and citing the source does **NOT** absolve you from plagiarism. When you write a paper, essay, or proposal you **MUST** use your own wording and cite your source(s). Pay attention to my handout on writing, especially the section on what must be cited. All students caught violating this code of ethics will fail that portion of the course that was abused. This*

usually results in a failing grade for the entire course (when I was an undergraduate this always resulted in expulsion from the institution). Your cell phones must be turned off during exams and under no circumstances will you be permitted to answer phone calls. You will also not be permitted to leave or return to the classroom during an exam for any reason, unless you first obtain permission from the primary instructor of the course.

### IMPORTANT CONSIDERATIONS AND TIPS

The cost (\$1,675 for 3–15 participants + UMSL tuition and fees for 3 credits) excludes round trip airfare from STL (estimated at \$1,150) or other US city of origin to MIA, covers airport exit tax from Guyana, **primitive** accommodations (i.e., living in huts in the rainforest, cold showers with black-water from a spring, using flushing outhouses etc.), all meals (multicultural Guyanese cuisine), ½-day trip to Georgetown, small plane trip in Guyana to Kaieteur Falls, and overland trip to a coastal savanna, Dubulay Ranch. **It is prudent to have a minimum of US \$100 in cash for your own spending. We have worked hard to keep your costs close to 2007 levels.**

#### *Required Text*

**Bourne, G. R. & Bourne C. M. Eds. 2010. The CEIBA Reader. Yerfdog Publishing, St. Louis, MO. (Price \$45—Must be read).**

#### *Recommended Text*

Kricher, J. C. 1997. A Neotropical Companion. Princeton University Press, Princeton. **(Pay special attention to the Appendix that should be read with, spouses, significant others, parents or guardians to fully appreciate benefits and costs of experiencing the Neotropics)**

#### *Censusing Techniques*

Foster, M. S. Ed. 1994. Biological Diversity Handbook Series: Measuring and Monitoring Biological Diversity (Standard Methods for Amphibians etc). Smithsonian Institution Press, Washington.

[www.discoverlife.org](http://www.discoverlife.org) for censusing and monitoring ideas.

#### *Important Research Papers* [EACH PARTICIPANT IS RESPONSIBLE FOR MAKING OWN COPIES]!

Kiss, A. 2004. Is community-based ecotourism a good use of biodiversity conservation funds? Trends in Ecology and Evolution 19:232-237.

Wall, D., Mooney, H., Adams, G., Boxshall, G., Dobson, A., Nakashizuka, T., Seyani, J., Sampler, C. & Sarukhan, J. 2001 An international biodiversity observation year. Trends in Ecology and Evolution 16:52-54.

Yoccoz, N. G., Nichols, J. D. & Boulinier, T. 2001. Monitoring of biological diversity in space and time. Trends in Ecology and Evolution 16:446-453.

#### **USEFUL JOURNALS FOR PREPARING YOUR FINAL ARTICLE:**

**National Geographic Research and Exploration; Ecology; Trends in Ecology and Evolution; Conservation Biology etc.**

**BAGGAGE**—You are each allowed **two** checked bags on domestic flights connecting with Caribbean Air, the sum of three outside dimensions of each bag must not exceed 62 ins. Total free baggage allowance is 100 lbs. The weight of each bag must not exceed 50 lbs. Carry-on bag (**ONE** piece only) should not exceed 8x14x18 ins, and maximum weight of 12 lbs. **Check baggage to Georgetown (GEO) on AA 2515 at St. Louis or other**

city of origin for automatic transfer to Caribbean Airlines BW 483!

**YOU ARE AMBASSADORS OF THE USA SO BEHAVE ACCORDINGLY—ABSOLUTELY NO DRUG TRAFFICKING OR USE ON THIS TRIP. NO USE OF ALCOHOL. PLEASE KEEP CIGARETTE SMOKING TO A MINIMUM, THERE WILL BE NO TRIPS TO THE STORE TO PURCHASE CIGARETTES, AND DO NOT LITTER WITH BUTTS!!! IF YOU HAVE BODY PIERCINGS WITH LOTS OF STUDS AND RINGS, PLEASE REMOVE THEM BEFORE ARRIVING IN GUYANA (it makes getting through Guyana Immigration and Customs much easier). YOU CAN REINCENT YOUR JEWELS ON ARRIVAL AT CEIBA.**

**YOU MUST HAVE A PRESCRIPTION FOR A MALARIA PROPHYLAXIS (LARIAM is no longer effective and MALARONE is expensive, so if you can tolerate tetracycline get DOXYCYCLINE 100 mg/daily). CONTACT YOUR PHYSICIAN OR THE MEDICAL STAFF AT THE COUNTY MEDICAL CLINIC by mid-November 2010 for immunization or boosters for yellow fever, tetanus/diphtheria, typhoid, measles/mumps/rubella, polio, hepatitis A (required) and B. If you plan to work (handle) with bats you must be immunized for rabies. Check with Centers for Disease Control (<http://www.cdc.gov/travel/tropsam.htm>) or Hotline 404-332-4559 for needed immunizations and travel tips.**

#### ANNOTATED LIST OF CLOTHING AND SUPPLIES

Choose as Appropriate From the Following List

##### **SHELTER:**

Items in **bold type** are essential. **Sleeping pad** (the type used for exercising will be adequate so don't spend a lot of money for say a Thermarest Dreamtime @ \$200) for use in tent-cots provided by CEIBA; **2 bed sheet sets and pillow**, and light blanket. **Sponge ear plugs** (some of us snore and roosters begin crowing at 1:30 am). **A Coleman camping fan for sleeping comfort is recommended. NO SLEEPING in the rainforest *per se* (injury or death by falling branches or trees too great).**

##### **CLOTHING:**

Best to travel light, so bring a **diversity of quick drying clothing (Columbia Titanium & The North Face**, usually on sale at Sports Authority, are recommended)—2 pairs field pants, shorts, (cotton blend breathes & dries rapidly); a heavy long-sleeved shirt or lightweight sweater; several T-shirts. Fast drying underwear; swim suit; **2 full sized sports towels** and wash cloths; wet ones; toilet articles (including enough sanitary pads/tampons to get you through your stay in Guyana [remember we are going to be camping in the rainforest]). Raingear and/or folding umbrella, it's the rainy season. Shoes—lightweight rubber boots for wet sites. Tongs/flip-flops or beach socks for around camp, general purpose lightweight hiking shoes or sneakers. Hat for rain and sun (**good sun block also**). Extra glasses, contacts, sunglasses etc.

##### **SUPPLIES:**

**Laptop computer/flash drive; flashlight** and/or **headlamp** (Energizer Professional uses 2 or 3 AAA Batteries and is highly recommended check low prices at Lowe's. Don't forget **extra batteries** for nocturnal studies [frogging and batting]). Pocket knife (must be packed in your checked luggage). **Digital Camera with built in flash** (extra batteries), with adequate digital storage and USB cable for down-loading your pictures, **binoculars**, Neotropical plant, bird, fish, and mammal guides (if you already own any). **Calculator**. Reasonably water-tight container with silica gel packs for storing moisture-sensitive supplies listed immediately above (Rubber-maid or Tupperware containers). Water bottle/canteen, day pack, **lots of bug repellent**. "**Rite in the rain field notebook**" and pens,

**multisubject notebook, ballpoint pens, pencils, ruler, dissecting kit, hand lens.**

***PERSONAL MEDICAL SUPPLIES:***

Any personal prescriptions (consult your physician—should include if possible a good pain killer such as Tylenol II; Flagyl for acute amoebic dysentery, giardia, vaginal infections such as trichomonas; a good broad-spectrum antibiotic such as Cipro, Tetracycline or Minocin for many common bacterial infections), and over-the-counter medications you might need (among your favorites, I highly recommend Benadryl for allergies, mosquito, black-fly, wasp and bee stings (pills, liquid, and/or spray), Imodium A-D for diarrhea, Monistat, Monistat-Derm or equivalent cream for treating fungal infections of the vagina, buttocks and skin; Desenex antifungal ointment for athlete's foot [you are in the moist tropics, fungus is everywhere, so be prepared]; New Skin antiseptic liquid bandage or Bactine antiseptic and anesthetic for minor cuts, scratches and bruises), daily vitamins, **bee-sting kit and breathing tube if allergic to wasp and bees, personal first-aid kit**, and powdered **GatorAid** (for rehydration if you come down with vomiting and diarrhea).

***FOOD:***

Personal candy, cookies, gum, and “snackos” (if desired).

***TO AVOID SERIOUS INJURY OR WORSE FOLLOW ALL DIRECTIONS OF YOUR INSTRUCTORS!! BE ALERT AND AWARE OF YOUR SURROUNDINGS***

***YOUR ADDRESS IN GUYANA:***

**CEIBA Biological Center**, Madewini, Linden Highway (for filling out Guyana Immigration Form issued on plane just after leaving Trinidad. Fill out before getting to Guyana). See [www.ceibabiologicalcenter.org](http://www.ceibabiologicalcenter.org) for description of CEIBA Biological Center

**Disclosure: because of inflation in Guyana you may have to contribute additional money to offset travel costs in Guyana!**

**YOU CAN BE CONTACTED ON DAYS WE ARE AT CEIBA BY YOUR RELATIVES IN CASE OF AN EMERGENCY BY THEM CALLING DR. BOURNE'S GUYANA CELL AT 011-592-671-4205 (*Real Emergencies Only*).**



Locations of CEIBA

Biological Center on the Madewini River, a tributary of the Demerara River in the white sand belt of coastal Guyana, and Karanambu Ranch on the Rupununi River in the North Rupununi savannas.



Dubulay Ranch a coastal savanna on the west bank of the Berbice River, primarily on white sands, site visited in Option I.

In summary, this is a research course designed to teach immersion discovery to UMSL students—your task is to study, monitor, and map species distributions, and to share accurate digitized data for understanding and managing the conservation of impacted biota and ecosystems.

### **Diversity Indices**

To make sense of your results we will use two diversity indices, species diversity (number of species sampled) and Shannon-Weaver Index (Shannon & Weaver 1949;  $H'$ ):

$$H' = -\sum_{i=1}^S p_i \log_n p_i$$

where  $H'$  is the amount of diversity in a group of  $S$  species,  $p_i$  is the fraction of the whole sample composed of species  $I$ , and  $n$  is the base of logarithm used.

Brower, J.E., Zar, J.H. & von Ende, C.N. 1997. Field and Laboratory Methods for General Ecology. 4<sup>th</sup> Edition. WBC McGraw-Hill, Boston, MA.

Shannon, C.E. & Weaver, W. 1949. The mathematical theory of communication. University of Illinois Press, Urbana, Illinois.

**Offered by**  
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