

# Ecology

## BI 410 Syllabus

### Spring 2016

#### Class Meeting:

BI 410 M/W 12:30 p.m. – 1:50 p.m. SC 112

BI 410 Lab F 1 p.m. – 7 p.m. SC110/Field Sites

Instructor: F. Camacho SC232; 735-2385; [fcamacho@uguam.uog.edu](mailto:fcamacho@uguam.uog.edu)

Office hours: MW 9-11 a.m. and 2-3 p.m. Otherwise by appointment

#### Catalog course description

A study of fundamental concepts and methods of ecology illustrated by the examination of local natural systems: vegetational, faunal, and physical factors of the environment are considered. The course includes three hours of lecture weekly and six hours of laboratory weekly. Prerequisite: BI 157-157L and BI 158-158L or equivalent.

#### Course content

Autecology, population, community and ecosystem ecology. Factor's of man's impacts, including overpopulation, deforestation, pollution, introduction of exotics, etc.

#### Skills and background required or expected

BI-157-157L and BI 158-158L or equivalent. MA 161A & B and MA203.

#### Conceptual structure of the course

The lecture component of the course proceeds from a review of the scientific method and hypothesis testing through abiotic and biotic factors affecting the distribution and abundance of organisms and ultimately to global ecological phenomena, including climate change and the spread of invasive biota. Generally, we will approach ecology from a hierarchical perspective, starting with individuals, and then through populations, communities, and ecosystems. Throughout the course, examples from the literature as well as examples from Guam systems will be presented and discussed.

The laboratory component of the course is designed to both reinforce concepts from lecture as well as provide hands on training in the analyses of physicochemical and biological samples. A considerable amount of quantitative analysis is expected from the student, including the use of probabilistic and deterministic models to make decisions about hypotheses. Furthermore, the lab section is designed to improve the scientific communication skills of students through lab reports and oral presentations.

#### Format and activities in the course

The schedule includes three hours of lecture each week and six hours of lab. Lecture activities include in-class exams as well as homework assignments and directed readings from the scientific literature. There will be a total of three (3) exams during the semester. These will be worth a total of 100 pts each. Exams will be mixed format tests, including, but not limited to short answer and essay questions.

Labs are primarily field trips with appropriate laboratory analyses to be conducted when we return. Labs will be held rain or shine, unless the weather conditions are severe, in which case, an alternate activity will be scheduled. *Come prepared.* Active participation in labs is required. The lab reports will be evaluated critically for style, grammar, and substance. The reports will include two group papers and three independently composed papers based upon field data. Lastly, students will present the results from one of the field trips at the end of the semester in a seminar format.

### **Textbook and readings**

The textbook for the lecture component of ecology is:

*Krebs, C.E. 2008. Ecology: The Experimental Analysis of Distribution and Abundance, 6<sup>th</sup> ed. Benjamin Cummings, San Francisco. 655 Pp.*

The lab manual is:

*Brower, J., J. Zar, and C.N. von Ende. 1998. Field and Laboratory Methods for General Ecology, 4<sup>th</sup> ed. McGraw-Hill. 288 Pp.*

As you will see, Krebs (2008) is very timely, but is also structured rather unconventionally. I have chosen to model much of my lecture material around his book, but I will also provide additional readings outside of class that will serve to improve your understanding (and hopefully your appreciation) of particular concepts. These include review articles and original articles. You are expected to read these selections before class.

Regarding lab reports, the lab manual is a guide for potential methods of sampling and analysis. However, we will also be using very technical field sampling equipment (and many not so technical). These equipment require some understanding of how they work and I expect that you and your classmates will know how to operate and maintain them--including calibrating them--BEFORE we head out into the field. Lastly, your lab reports will be drawing from a variety of sources and I expect that you will utilize the library and the electronic databases that are available to you to compose them. The use of internet resources (i.e., web-pages and non-academic websites) is explicitly discouraged and I will actually take off points if I see material from Wikipedia in your reports.

The readings for Krebs (2008) are listed at the end of the syllabus.

### **Additional materials or equipment**

Appropriate clothing, especially hat, footwear for field trips (see field trip policies on the web, [http://university.uog.edu/bi-100/Field\\_trips.htm](http://university.uog.edu/bi-100/Field_trips.htm))

### **Assignments, Term Papers and Exams**

As mentioned above, there will be three exams that will test you on your understanding of ecological concepts and your ability to synthesize ecological information. These exams are mixed format tests and are weighted heavily towards critical thinking, essay writing, and data analysis. Each exam will cover a series of topics and none of these tests are cumulative

exams. That being said, expect that questions are likely to draw on concepts that may have been covered in previous exams. These exams will be during the lecture section of class.

There will be homework and class assignments that will be worth a total of 100 pts toward your final grade. Some assignments involve critiques of selected readings that I will provide throughout the course of the semester. Other assignments will be more quantitative, including several simple modeling exercises in Excel. These assignments and their due date will be given later during the semester.

Lab reports constitute the most number of points (50%) towards your final grade and should be taken very seriously. As upperclassmen in your discipline, your writing skills should already be relatively refined. Your reports will focus on particular questions, and thus are going to be hypothesis driven. There are no free passes on field work and everyone will have a job to do on the field trips. There is no maximum number of pages for each report, but the body of your reports must be no less than 8 pages and must be double spaced with 12 pt font, 1 inch margins, graphs, tables etc. The formatting for your references will follow the style of the Council of Science Editors (formerly Council of Biological Editors) or CSE. Several websites have guides to referencing using CSE. e.g., <http://library.osu.edu/help/research-strategies/cite-references/cse/>

### **Evaluation and grades**

The points breakdown for the lecture section is as follows:

Tests (3)	300 pts
Lab Reports (4)	400 pts
Homework & Quizzes	100 pts
Total	800 pts

Your final grade will be based upon the following percentages:

A	90-100%	[720-800 pts]
B	80-89%	[640-719 pts]
C	70-79%	[560-639 pts]
D	60-69%	[480-559 pts]
F	≤60%	[≤480 pts]

### **Course policies**

#### General

Plagiarism and other forms of academic dishonesty are serious offenses and will result in you failing the course and potentially being expelled from the University of Guam. Cheating during exams or on projects is inexcusable and will not be tolerated.

## Lecture

- Homework assignments must be turned in on time in order to receive credit.
- I do not take attendance in lecture, but your participation is critical for me to be able to evaluate your performance and for you to maximize your learning potential.
- There will be no makeup exams. If you miss one exam, I will base your exam average on the remaining two exams PROVIDED YOU HAVE AN EXCUSED ABSENCE. The only excusable conditions are medical emergencies and off-island travel for a conference with prior approval from the instructor. I will ask for a doctor's excuse for the former. Otherwise, you will receive a zero for the exam.
- Show up to exams on time. I do not distribute exams to students who come in the door after exams have already been completed by other students.
- The use of cell phones and other electronic devices during exams is prohibited without my prior approval.

## Laboratory

- Field work is inherently more dangerous than most laboratory work. Nevertheless, engaging in risky or dangerous behavior in either setting will result in a zero for the day.
- Under no circumstances are you to go off into an area of a study site alone and without informing your instructor about where you and your partner(s) are going to.
- Be well-hydrated for hikes and bring along at least 1 L of water for the field trip. Eat breakfast and lunch. A snack is also highly recommended.
- Your lab reports include both group and individual papers. I expect that each group will have an equal division of labor so that all individuals contribute equal amounts of effort.
- Individual papers are entirely your own work. Articles may be shared amongst groups, but the composition and writing of those papers are entirely the work of the individual.
- There will be time to clean up equipment at the end of each lab. All lab equipment must be stowed in the lab storage room and data distributed amongst groups BEFORE the end of each lab day.
- Expect that some labs will last longer than others and that some projects will require sampling outside of class time.
- If you don't know how something works, ASK!!!

## **Special needs**

Students with special needs must make arrangements through the ADA office. The University makes every attempt to accommodate such requests (see below). Students who cannot meet the requirements of a particular field trip must discuss the problem with me in advance.

## **UOG Disabilities Policy**

In accordance with the Americans with Disabilities Act (ADA) of 1990 and the Rehabilitation Act of 1973, the University of Guam does not discriminate against students and applicants on the basis of disability in the administration of its educational and other programs. The University offers reasonable accommodations for a student or applicant who is otherwise qualified, if the accommodation is reasonable, effective and will not alter a fundamental aspect of the University's program nor will otherwise impose an undue hardship on the University, and/or there are not equivalent alternatives. Students are expected to make timely requests for accommodation, using the procedure below\*. If appropriate, the University may choose to consult with such individuals, at or outside the University, to provide expertise needed to evaluate the request for

accommodation. Each student bears the responsibility for initiating and then documenting a disability-related request for accommodation in the manner requested in this Policy.

**\*full text at: [www.uog.edu/dynamicdata/EqualEmploymentOffice.aspx?siteid=1&p=66](http://www.uog.edu/dynamicdata/EqualEmploymentOffice.aspx?siteid=1&p=66)**

### Tobacco use

As biology students, you should be acutely aware of the risks of tobacco use, including the increased risk of lung and oral cancer and emphysema, and vaping. UOG is a tobacco-free/smoke-free/vaping-free/e-cigarette-free campus. Thank you for not using tobacco products or e-cigarettes on campus, for helping to fight cancer, and for helping to make UOG a healthy learning environment.

### Student Learning Outcomes (SLOs)

<b>Course SLOs</b>	<b>PLOs*</b>	<b>ILOs*</b>	<b>Assessment Method</b>
1. Apply ecosystem concepts such as symbiosis, food chains and webs, physical & biological limiting factors, element cycles and energy flow, etc.;	1a, 1b, 2, 3	1, 2, 4, 5, 6, 7	Exams, Laboratory Reports, Oral Presentations
2. Utilize field techniques and quantitative skills to take measurements of ecological variables, e.g. gather population ecology data and test e.g., water temperature, hardness, pH and salinity. Prepare data compilations using graphs, tables, and other scientific figures for processes involved in 1., above; and	1b, 2, 3, 4, 5, 6	1, 2, 6, 7	Laboratory Reports, Oral Presentations
3. Apply writing skills to produce, (4 with partners and independently), five scientific papers resembling environment impact assessments of specific local ecosystems, using information obtained from field work, techniques of 1 & 2, above, and from scientific literature.	6, 7	1, 2, 3, 6, 7	Laboratory Reports, Oral Presentations

\*Please see below for a list of Program and Institutional Learning Outcomes

#### Program Learning Outcomes

##### BI PR-1: Disciplinary Knowledge and Skills

A. Graduates have advanced understanding of the nationally-recognized core competencies in biology. Students taking biology for GE will have a basic grasp of some of these concepts, especially those relating to the interface of science and society, and will advance their scientific literacy. Students contribute to the public good by using their knowledge and skills in internships, research and volunteering, and in responsible use of natural resources and technology.

B. Graduates use their knowledge and skills to solve problems in ecology, genetics, molecular biology, systematics, and evolution. They can apply their knowledge and skills to locally important issues such as island biogeography, conservation, and endangered species problems; they are also prepared to address broader questions such as biomedical research. They apply elements of thought and intellectual standards to problem solving and effectively judge the usefulness and accuracy of external sources of information.

C. Graduates approach scientific questions using scientific criteria and know how these criteria differ from those in other disciplines and other worldviews.

D. Graduates and GE students have metaknowledge of the diverse ways in which scientists in various disciplines think and work, and how these ways differ from and are useful to public policy making.

#### BI PR-2: Interdisciplinary Knowledge and Skills

D. Graduates apply relevant concepts from chemistry and physics to biology problems; they approach problems in terms of interdisciplinary teams, where appropriate, aware of how other branches of biology and other sciences could be used to "come from the question"

#### BI PR-3: Quantitative Skills

Graduates apply numerical methods in collection and analysis of biological data. They formulate testable hypotheses and create effective experimental designs using their knowledge, understanding, and practical experience of scientific instruments and statistics.

#### BI PR-4: Research Skills for Laboratory and Field

Graduates are competent in basic biology procedures and safety in the laboratory and field.

#### BI PR-5: Communication Skills

Graduates use scientific literature and diagrams as a source of information, properly cite sources and avoid plagiarism, and use computer software to create text and graphics to communicate results effectively through print and oral presentations. They take initiative in searching for relevant sources in the scientific literature and assess evidence in writing scientific proposals and reports.

#### BI PR-6: Digital Literacy

Graduates have experience with contributing to and using large databases in bioinformatics, environmental sciences, and biological collections and have the general knowledge and confidence to mine "big data" sources.

#### BI PR-7: Professionalism

Graduates follow ethical principles involved in science, ranging from integrity and honesty to authorship criteria; ownership of samples and data; appropriate manipulation of data and images; and (where appropriate) ethical issues in human subject and animal research.

#### Institutional Learning Outcomes

ILO-1: Mastery of Critical Thinking and Problem Solving

ILO-2: Mastery of Quantitative Analysis

ILO-3: Effective Oral and Written Communication

ILO-4: Understanding and Appreciation of Culturally Diverse People, Ideas and Values in a Democratic Context

ILO-5: Responsible Use of Knowledge, Natural Resources, and Technology

ILO-6: An Appreciation of the Arts and Sciences

ILO-7: An Interest in Personal Development and Lifelong Learning

## Student work load

Expect that you will be reading approximately 40 – 50 pages a week from the text and selected readings. This usually translates into a minimum of four to six hours of studying per week. A good practice is to make notes based upon the readings before class and then revise your notes after class.

Lab reports require considerable effort and time and it is best not to delay composing your report once you have received your lab assignments. Expect to spend at least eight hours a week on lab reports.

### Additional resources

There are numerous primers and introductory ecology texts available in the library.

### Contact information for classmates

At your discretion

		Lecture Schedule (subject to change)	Chapter Alignment
Lecture Schedule:			
Jan	20	Intro to ecology; Ecology and evolution	Ch.1 & 2
	22	Geographical ecology; Abiotic limits to distribution	Ch.4 &6
	27	Geographical ecology; Abiotic limits to distribution	Ch.4 &6
Feb	1	Functional ecology and biotic limits to distribution	Ch.5
	3	Functional ecology and biotic limits to distribution	Ch.5
	8	Range limits/Pop growth in continuous and discrete time	Ch. 7&9
	10	Individual ecology	Ch.8 & 9
	15	Logistic growth models and demography	Ch.8 & 9
	17	Logistic growth models and demography	Ch.8 & 9
	22	<b>Exam I</b>	
Mar	24	Life Tables & Regulation of population size	Ch. 9 &14
	2	Life Tables & Regulation of population size	Ch. 9&14
	7	Holiday	
	9	Guest Lecture	
	14	Competition	Ch. 10
	16	Predation and Herbivory	Ch.11&12
	21	Spring Break	
	23	Spring Break	
	28	Community structure: Succession/Biodiversity in space	Ch.18&19
	30	Community structure: Succession/Biodiversity in space	Ch.18&19
Apr	4	<b>Exam I</b>	
	6	MacArthur-Wilson model of island biogeography	Ch. 19&20
	11	Food web theory	Ch. 20
	13	Food web theory	Ch. 20
	18	Disturbance, stability and resilience	Ch. 21
	20	Ecosystem Services	
	25	Primary productivity in space and time	Ch.22
	27	Secondary production	Ch. 23
May	2	Nutrient cycles I & II	Ch.24
	4	Nutrient cycles III	Ch.24
	9	Climate change	Ch.25
	11	Climate change	Ch.25
		<b>Exam III</b>	

## Lab Schedule (subject to change)

### Lab Schedule:

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Jan	29	Introduction to soil and water analyses; Report requirements
	5	Masso reservoir: Leaf litter breakdown and inputs in southern Guam
Feb	12	Geus: Habitat use by stream macrofauna
	19	Geus: Habitat use by stream macrofauna
	26	Geus: Habitat use by stream macrofauna
	4	UOG CNAS Farm
Mar	11	UOG CNAS Farm
	18	TBA
	25	Spring Break--No class
	1	Ritidian: Ungulate disturbance and and diversity
Apr	8	Lost pond: Ungulate disturbance and and diversity
	15	Masso Reservoir: Leaf litter breakdown and inputs
	22	Pago Bay: Algal zonation on a windward reef flat
	29	Cocos Island: Bird populations and habitat use
May	1	Writing lab
	8	Student presentations

### Report Due Dates

Group Report #1	February 27
Group Report #2	March 18
Individual Report #1	April 16
Individual Report #2	May 14



## **Spring 2016 BI 416 L Cellular Physiology Laboratory**

**Laboratory Schedule:** Sc 103; Monday: 11 AM to 1.50 PM; & Wednesdays, 4 P.M. to 6.50 P.M.

### **Instructor:**

Shubir Ghosh, Ph.D.  
Professor of Biology, University of Guam

### **Office Location & Hours:**

Sc223; By Appointment  
E-Mail: [sgghosh@ug Guam.uog.edu](mailto:sgghosh@ug Guam.uog.edu)

### **Syllabus Disability Statement:**

"If you are a student with a disability who will require an accommodation(s) to participate in this course, please contact me and the Institutional Compliance Officer privately to discuss your specific needs. You will need to provide me documentation concerning your need for accommodation(s) from the EEO/ADA & TITLE IX Office. If you have not registered with the EEO/ADA & TITLE IX Office, you should do so immediately at 735-2244, (TTY) 735-2243 to coordinate your accommodation request."

### **Liability Waiver:**

A signed liability waiver will be required from all students for the lab course.

Laboratory safety procedures involves working in an efficient, orderly, and safe manner and using appropriate safety equipment (example, safety goggles, UV goggles, gloves, etc.).

The lab involves the use of microbes, acids/alkali, organic reagents, bunsen burner, etc.

In the first day of lab class all safety issues will be discussed. It is important that you clearly understand all the rules and regulations – please do not hesitate to ask me any safety related question that you may have.

### **Lab Manual:**

- There is no required Lab Manual.
- Your Cellular Physiology textbook (& General Chemistry for buffer preparation) has all the necessary background theoretical information required for understanding the basis of your lab work.
- Protocols will be discussed prior to performing lab work and appropriate handouts will be provided. In some cases, protocols will be dictated – you would have to write them down in your lab notebook.
- Keep track of the handouts. Contact me directly if you have any questions regarding lab work, protocols, handouts, etc.

### **Lab Notebook:**

- Record your Lab work in Laboratory Notebook during the lab – Mandatory.
- *This logbook has to be turned in during the Midterm and Final Exam.*

## **Methods for Evaluation and Grading:**

### **Grading Summary:**

Lab Conduct & Performance, Reagent Preparation, Lab Notebook:	50%
Lab Midterm Exam:	20 %
Lab Final Exam:	20 %
Lab Report:	10 %
<b>Total:</b>	<b>100%</b>

<u>Letter Grade</u>	<u>Percent</u>
Grade "A"	90 - 100%
Grade "B"	80 - 89%
Grade "C"	70 - 79%
Grade "D"	60 - 69%

**Please Note:** Typically it will take atleast a week to grade all the exams. A post-exam review will be held to discuss the exam. Students should return their exams after the review. Students should not take the exams out of the classroom or take photos of the exam. The exams will be available throughout the semester for student review during office hours.

### **Lab Course Policy**

- **The primary requirement for qualifying for this course is student's punctual attendance, sincerity in performing lab work, orderly conduct in the laboratory maintaining all the rules & regulations of laboratory safety, conduct, and courtesy to fellow lab mates.**
- **In order to receive a grade for the Cellular Physiology Lab course, student's will have to prepare appropriate reagents as directed, and perform all the experiments planned for the class. If a student cannot complete all the requirements for the course, no grade will be given to that student at the end of the semester.**
- **No "make up" labs will be conducted. No "Incomplete" Grade will be given in this course.**
- **Students are required to bring your syllaus and lab log book for every lab class. Students will also need to turn in their Lab Note Book, during the Midterm and Final Exam.**
- **Attendance & Performance will be recorded for each lab.**
- **A Liability Waiver for the lab course is required from each student and will be collected on the first day of lab class.**
- **Please do not hesitate to contact me if you have any questions regarding lab work, protocols, handouts, et**

**Laboratory Safety**

**Please Read before you Proceed !**

**A signed liability waiver form will be required from all students.**

**This is to remind you that laboratory safety procedures involves working in an efficient, orderly, and safe manner -**

Generally, you should stay in your lab station and you and your lab partner are responsible for the materials including the **operation of the Bunsen burner** in your lab station. When you need to leave your station, you should do this in a smooth and unhurried manner so as not to bump into anyone else. Please do not leave your station and go to a neighbor's lab bench and switch on their Bunsen burner and use their reagents, etc. Please do not use latex gloves while operating the bunsen burner. The area where you have the Bunsen burner should be free of all paper, books, flammable material (alcohol, etc.). Appropriate clothing should be worn and please do not use hair sprays - those who have long hair should take the necessary precautions.

You should wear safety goggles while using reagents like acids and stains, etc. You should wear the prescribed UV safety glasses when UV is in use.

If you need help or have any questions during the lab, you should not hesitate to ask the Instructor.

**For every lab class, before you start your lab work, review the safety precautions that need to be followed – I will discuss all safety precautions that need to be taken. Do not start lab work if you are unsure of the safety instructions – please ask for the Instructor's assistance.**

No food or drinks allowed in the lab.

Lab tables must be cleaned before and after each lab class.

No bags or books should be placed on the floor.

All materials used for a lab exercise must be returned to the proper storage area.

Microscopes must be cleaned (oil lens!) with care prior to returning to the microscope storage cabinet.

Test tubes and other glassware must be rinsed after use and placed in the designated area.

Lab chairs must be returned to the lab table.

Tops to solution bottles must be secured and bottles returned to the proper storage area.

Regular trash must be placed in the proper waste container.

The lab instructor must be informed of any spills, broken glassware, or broken slides – there is a special container for broken glass.

No materials can leave the laboratory.

## Spring 2016    BI 416L : Cellular Physiology Laboratory Work Syllabus

- ❖ *Modifications to the syllabus (in terms of experiments and change in schedule, etc) may be made depending on availability of equipment, reagents and other considerations.*
- ❖ *If the above are not available, then simulations of lab experiments will be presented along with an interactive discussion session. Students will also be required to present a 15 minute seminar on a cell biology topic that will be assigned to each student or in groups of two.*
- ❖ *Lab work begins with a pre-lab discussion. Please take the first 5- 10 minutes to settle down and arrange your notes, protocols, etc.*

### Lab 1 :

- Introduction to Cellular Physiology Lab
- Lab Safety & Conduct
- Equipment Operation and Care
- Writing Lab Notebook & Lab Report
- Pre-Test
- Preparation of Biochemical Buffers – Henderson-Hasselbach Equation

### Lab 2 :

#### Safety: Please take appropriate microbiological precautions working with E.coli & Yeast

- Procedures useful for Recombinant DNA Technology: *A General Discussion*
  - Bacterial Culture Media & Methods and Pure Culture technique
  - Bacterial Growth Kinetics
  - Determining Bacterial Population Counts using Spectrophotometer
  - UV Spectrophotometry determination of concentration of isolated DNA
- Introduction on how biology of eukaryotes are investigated experimentally:
  - Cell Cultures & Animal Models; Phase Contrast & Fluorescence Microscopy
- Oil-immersion Phase Contrast Microscopy:
  - Dimensions and Units of cells and subcellular organelles
  - Bacteria (Prokaryote) & Yeast (Eukaryote) – **use precautions working with microbes.**
  - Staining of Cheek cells with Methylene Blue
- Time-lapsed Video Microscopy Clips

### Lab 3 :

- Immunology:
  - Antigen - Antibody reactions using double diffusion technique in agar.
  - Check plates the next day!
  - Antibody inhibition of viruses (**use gloves and precaution working with viruses**) – manufacturer has discontinued sale of virus and antibody – so we will have a general discussion on Immunotherapy.
  - ELISA technique

#### **Lab 4 :**

**Safety: Wear safety goggles at all times while working with acetic acid, stains, etc.**

- Drosophila Polytene Chromosomes: An examination of chromatin
  - Drosophila Polytene Chromosome Squash Preparation: Aceto-orcein Staining

#### **Lab 5, 6 & 7 :**

**Safety: Wear safety goggles at all times while working with acetic acid, stains, etc.**

- Chromatin: Drosophila Polytene Chromosome Squash Preparation
  - Azure B staining (DNA & RNA)
  - Fast Green staining (Protein)
  - Inquiry-based Project Work

#### **Lab 8: LABORATORY MIDTERM EXAMINATION + LAB NOTEBOOK**

#### **Lab 9 & 10 :**

**Safety: Wear "UVgoggles" (not splash goggles) at all times while working with UV, & appropriate microbiological precautions working with E.coli.**

- Recombinant DNA Technology:
  - Isolation of Recombinant Plasmid DNA containing the Jelly Fish Green Fluorescent Protein Gene (GFP) from E.coli bacterial host using Alkaline Lysis Mini-Prep Method.
  - Restriction Endonuclease Digestion & Gel Electrophoresis Analysis and Mapping of isolated GFP plasmid DNA.

#### **Lab 11 & 12:**

- Proteins: Protein Fingerprinting; Prokaryote (Bacteria) and Eukaryote (Yeast) Proteome
  - Isolation of Nuclei from yeast
  - Proteomics: Extraction of Proteins from Yeast Nuclei and Cytoplasmic fractions (safety precautions working with microbes, etc.)
  - Extraction of proteins from bacteria and other sources of your choice.
  - Protein Analysis using SDS-PAGE method

**Lab 13 :**

**Please Note: wear UV goggles while working with UV & precautions working with E.coli)**

- **Human/Mouse Sub-Genomic Library Construction Project: Cloning HeLa cell or Mouse Genomic DNA fragments into plasmid vector, using insertional inactivation strategy for selection of transformants (inserts subcloned into GFP coding sequences in GFP plasmid Vector).**
  - Strategy for Library Construction Project
  - Restriction Digestion of Genomic DNA and Plasmid Vector DNA
  - Gel Electrophoresis of restricted Genomic DNA fragments, and Plasmid Vector DNA
  - Purification of Genomic Insert & Vector DNA fragments from agarose gels
  - Ligation of Genomic Insert DNA fragments to Vector DNA
  - Transformation of host E.coli with Ligation Mix
  - Selection and Analysis of Transformants

**Lab 14 : (wear UV goggles while working with UV & precautions working with E.coli)**

- "Sub-Genomic Library Construction Project" continues:
  - Separation of Restricted HeLa/Mouse Genomic DNA, and Plasmid Vector DNA by Agarose Gel Electrophoresis.
  - Purification of Size-Selected HeLa/Mouse Genomic DNA Insert fragments & Vector DNA fragment from agarose gels using Gene Clean Method.
  - Ligation of Genomic DNA inserts into Vector DNA.

**Lab 15 : (wear UV goggles while working with UV & precautions working with E.coli)**

- "Sub-Genomic Library Construction Project" continues:
  - Transformation of Competent E.coli host cells with Ligation Mix
  - Plating on Selective Media for Selection of Transformants.
  - Start Preparing Outline for Project Report
- "Sub-Genomic Library Construction Project" continues:
  - Analysis of Transformants for Determine Genomic Library Construction Success!

**Lab 16 : Final Lab Examination + Lab Report + Lab Notebook**

Spring 2016

BI 419L

Biochemistry Laboratory

Shubir Ghosh, Ph.D.

Professor of Biology

Sc223; E-Mail: [sghosh@uguam.uog.edu](mailto:sghosh@uguam.uog.edu)

**Lab Schedule:** Tuesday, 16:00 to 18:50 P.M.; Room Sc 103

**Office Hours:** By Appointment

**Prerequisites:** CH310a; CH311; CH310b; & CH312 or concurrent enrollment

**Syllabus Disability Statement:**

“If you are a student with a disability who will require an accommodation(s) to participate in this course, please contact me or the Institutional Compliance Officer privately to discuss your specific needs. You will need to provide me documentation concerning your need for accommodation(s) from the EEO/ADA & TITLE IX Office. If you have not registered with the EEO/ADA & TITLE IX Office, you should do so immediately at 735-2244, (TTY) 735-2243 to coordinate your accommodation request.”

**Laboratory Manual:**

- Appropriate Handouts will be provided in advance for each week’s lab experiment(s).
- The Lecture textbook provides theoretical details of the experiments that will be conducted.

**Methods for Evaluation and Grading:**

- Punctual Attendance and Performance of Experiments in an orderly manner is mandatory for obtaining a satisfactory grade in the Lab course.
- There will be one Midterm examination and a Final Examination.
- Graphs & Data and /or Laboratory Reports, for each week’s experiment should be submitted in the following week, during lab class. Students may discuss their data with their lab partners. *However, the lab report should be written by each student without anyone’s assistance and should not be shared with fellow students.*

**Grading Summary:**

<u>Letter Grade</u>	<u>Percent</u>
Grade “A”	90 - 100%
Grade “B”	80 - 89%
Grade “C”	70 - 79%
Grade “D”	60 - 69%

**Please Note:** No “Incomplete” Grade will be given for this course

Exams will not be returned to students. However, students can review their exams anytime during the semester during office hours. Students are prohibited from taking photographs of the test questions

**Safety & Liability Forms:**

- **The biochemistry lab involves reagents (acids, bases, acrylamide, etc.) that are dangerous and some that may potentially cause harm. All students are required to provide signed liability forms. Safety will be discussed in the first lab class. Each lab will begin with a discussion on safety issues related to the work to be performed for that lab – students should strictly follow safety instructions (use of goggles, UV glasses, gloves, chemical disposal, etc.).**

**Examination Schedule:**

- **You will be informed of the examination schedule well ahead of the exams!**
- **Students are advised to come by for office hours to discuss lab work, nature of the exams and the manner in which answers are expected as well as grading methods, etc.**
- **Pre- & Post-Exam Reviews will be conducted during the laboratory class.**

**Learning Objectives for Students:**

- (i) To learn the fundamentals of biochemistry laboratory science, including laboratory safety; scientific notation; significant figures in calculations; errors in experiments; accuracy vs. precision; international system of measurements; expressing concentrations of biochemical solutions; preparing dilutions; use of pipets and pipetman; analysis and interpretation of experimental data, and presentation of experimental data by preparing data tables, and graphs by hand and computer.
- (ii) To perform titration experiments to learn the acid-base behavior of amino acids.
- (iii) To conduct experiments in photometry and the use of both UV & visible spectrophotometer.
- (iv) To perform, with the use of the Spectrophotometer, a series of experiments on enzyme kinetics and enzyme regulation & inhibition.
- (v) To perform experiments in *in vivo* biochemistry, integrating genetics with biochemistry in order to learn the biochemical basis and approaches that are undertaken to explain genetic processes.
- (vi) To learn molecular biochemical approaches to purify and characterize proteins, essential to investigating cellular and organismal physiology.
- (vii) To learn instrumentation (eg. 2-D gel electrophoresis; HPLC; & Mass Spectrometry), critical for biochemical analysis.



Spring 2016

BI 419L

Biochemistry Laboratory Syllabus

**\*\*\* Syllabus and schedule based on availability of equipment and reagents and is subject to revision. If we are not able to conduct an experiment, it will be substituted by discussion sessions.**

**Week 1: Introduction to Lab; Safety; Pre-Test; Biochemical Buffers**

**Week 2: Acid-Base Properties of Amino Acids**

**Week 3: Photometry: Molar extinction coefficient; BSA Standard Curve, Protein/DNA/RNA Quantitation**

**Week 4: Introduction to Enzymes: Determination of the Activity of  $\beta$ -galactosidase enzyme**

**Week 5: Determination of  $K_m$  and  $V_{max}$  for  $\beta$ -galactosidase enzyme**

**Week 6: Effect of Inhibitors on  $\beta$ -galactosidase activity**

**Week 7: Effect of pH and Temperature on  $\beta$ -galactosidase activity**

**Week 8: Review of Labwork performed on Enzyme Kinetics & Review for Lab Exam**

### **Week 9: MIDTERM EXAM**

**Week 10: Catabolite Repression & Regulation of the E.coli lac operon - *in vivo biochemistry!***

**Week 11: Biochemical Analysis of results for Catabolite Repression & Regulation of lac operon; Protein Purification – Gel Filtration Chromatography**

**Week 12: Protein Purification – Purification of E.coli  $\beta$ -galactosidase by Affinity Chromatography And determination of Specific activity of  $\beta$ -galactosidase enzyme**

**Week 13: SDS-Poly Acrylamide Gel Electrophoresis Analysis**

**Week 14: Protein- Ligand binding studies – Scatchard Plot Analysis**

**HPLC & GC-MS Analysis in Biochemistry**

### **Week 15: FINAL LAB EXAM**

**Spring Semester - 2016**  
**BIOL 430 & 430L – SCIENTIFIC PHOTOGRAPHY**  
**University of Guam**

**Time:** T/Th - 12:30-13:50  
Th - 14:00-16:50  
**Dates:** 20 Jan - 23 May, 2016

**Location:** Lecture & Lab – ALS 124  
**Website:** [TBA](#)

**Instructor:** Dr. G. Curt Fiedler  
**Phone:** 734-2788  
**Office Hours:** M&W 1000-1200, T 1400-1600

**e-mail:** [gcfiedler@triton.uog.edu](mailto:gcfiedler@triton.uog.edu)  
**Office:** SC 118

Dr. James McConnell may help with the course, when time permits.  
**e-mail:** [mcconnel@uguam.uog.edu](mailto:mcconnel@uguam.uog.edu)

**Course Texts :**

- *Digital Nature Photography*, 2015, John Shaw, Amphoto Books
- There will also be assigned readings from various sources

**Cameras**

A camera with close focus and some manual features will be okay for the start of the course, but you will need to use other cameras to complete all of the required assignments. You will be expected to have read the manual and know how to operate your camera and change the settings. The most suitable cameras for this course are digital SLRs. Cameras and lenses may be available for short-term loan from the instructors. Arrangements can be made with the instructor for borrowing equipment. Always have your camera with you with charged batteries for class and labs. Be prepared to shoot during any class time.

**Course Description:**

Photography is one of the primary means through which scientific observation and research is documented and presented to colleagues and the public. By developing technical observational and aesthetic skills, students will learn how to extract relevant information from nature using macro-photography, photomicrography, special techniques and digital processing. Students will learn the basics of photography and the use of a computer as the digital darkroom. This course includes three hours of lecture and three hours of laboratory; weekly. Laboratories will either be field activities or hands-on experience in the classroom and perhaps through Moodle or other online medium.

**Course Objectives:**

After completing this course students will be able to:

1. Understand the nature of light and its role in photography.
2. Demonstrate the ability to use various cameras and upload, evaluate and process images.
3. Merge and process digital images to enhance focus and interactivity.
4. Given a choice of lenses, the student will be able to select an appropriate focal length to communicate their ideas.
5. Student will be able to choose the appropriate shutter speed, aperture and ISO to communicate desired idea.
6. Given a photograph, the student will be able to articulate criticism regarding the image and evaluate its quality.
7. Use lighting techniques and post-processing to enhance images to optimize desired image information.
8. Retouch an image to enhance specific objects in the image using the ethical considerations of publishing images in scientific literature.

**Work Load:**

Students will be expected to complete assigned readings. Students are required to attend the lectures and labs and participate in discussions during critiques. This course does require frequent submissions of photographs and preparation of two portfolios, and oral and poster presentations. You will be expected to keep a diary that logs your photographic settings and techniques. To prepare these assignments, a good deal of time will need to be allocated for photographing subjects. Many classes will be for reviewing images shot for the current assignment. Students will be expected to have the selected images on a flash drive so that the images can be moved to the instructor's computer for projection for the class to critique.

**Students with Disabilities:**

If you are a student with a disability who will require an accommodation(s) to participate in this course, please contact me or the Institutional Compliance Officer privately to discuss your specific needs. You will need to provide me with documentation concerning your need for accommodation(s) from the EEO/ADA & TITLE IX Office. If you have not registered with the EEO/ADA & TITLE IX Office, you should do so immediately at 735-2244, (TTY) 735-2243 to coordinate your accommodation request.

**Tobacco-free/Smoke-free campus:**

UOG is a tobacco-free campus. Thank you for not using tobacco products on campus, and for helping make UOG a healthy learning and living environment.

**Grading Information:**

For the lecture, grading is based on two Mid Term Exams (I, II), 10 (of 12) quizzes, and one Final Exam (III).

Point Breakdown:			Grading Scale:	
Task	#	Percent	Percent	Letter Grade
Quizzes	X8	15	90 – 100	A
Weekly Photo Assignments	x15	30	80 – 89	B
Fact Sheet	x1	20	70 – 79	C
Final Portfolio	x1	20	60 – 69	D
Final Exam	x1	15	00 – 59	F

**Course Components:**

**I. Lecture & Lab Sessions**

Lectures will occur at the scheduled times and location, barring any emergencies. Attendance to lectures is expected, but I will not take attendance. Absences, excused or unexcused, do not alter coursework responsibilities. Nearly 100% of the material on the exam and quizzes will come from lecture (the rest from the texts). Therefore, getting a good grade depends on regular lecture attendance. Lab sessions may include field trips on or off campus. Primarily, labs will reinforce concepts covered in lecture. In some cases, we will combine lecture and lab time for a single excursion. There may be optional lab sessions to take advantage of different types of shooting conditions (e.g., nighttime). *Those students who attend classes regularly and participate fully in the course, including the on-line forums, may receive consideration if they are a point or two below a final grade level on the above scale.*

**II. Quizzes**

There will be at least eight (8) quizzes in this course. Quizzes will occur as scheduled below and will generally be given at the start of class sessions. The quizzes will help prepare you for the Exams. All quizzes will measure your understanding of the material covered in preceding lecture material and corresponding text reading. Quizzes will consist of multiple choice, true/false, matching, short answer, and/or short essay questions. Your two lowest quiz scores will be dropped. Hence, only your top six (6) quiz scores will count towards your final grade if we have 8 quizzes. Quizzes are worth 15% of your final grade. *If you miss one quiz because of absence, excused or otherwise, it counts as your dropped quiz. There will be no make-up quizzes.*

**III. Exams**

There is a final exam in this course, no midterm. The final exam will test your understanding of the material covered in this course, including terminology and concepts. In other words, you will need to know both ‘what’ and ‘why’. Each exam may consist of multiple choice, matching, true/false, short answer, and/or essay questions. The final exam is worth 15% of your final grade. The final exam is tentatively scheduled for the last day of lecture class.

**Make up Quizzes & Exams**

- *There will be no make up quizzes!* If you miss a quiz, excused or otherwise, it counts as one of your dropped scores.
- There is only one exam – the final. If you miss it, you may be given an incomplete if you have an excused absence.

## **Photography Log**

You will be expected to keep a log of your photographic activities. You will need to log:

1. Time of Day
2. Location and site description
3. Assignment Objective
4. Camera settings
5. Other information relative to shooting or processing

Much of this information can be obtained from your photographs when viewed in Lightroom, Aperture or other Digital Asset Manager. We may ask you to submit your log for your weekly photo assignments.

## **Weekly Photo Assignments**

For each laboratory session, there will be a “photo assignment” you are expected to complete during the lab. Typically, this assignment will be a collection of 5-10 photos taken according to the theme of that particular lab session. All photo assignments must be posted on the online forum, so that they can be reviewed and provided feedback. There may be up to 15 photo assignments over the semester, worth 30% of the final grade.

## **Fact Sheet**

Each student will take and use photographs and page layout skills to make an information sheet (or FAQ) on some animal or plant or fungus or other organism. The fact sheet will be worth 20% of the final grade.

## **Final Portfolio**

Each student will submit a final portfolio comprised of 20 of the best photographs from the weekly assignments. The final portfolio is worth 20% of the final grade

## **Group Project**

Time permitting, there will be a group project, such as a photographic show or gallery display, highlighting the photo accomplishments of the class. This may be worth 10% of the final grade.

## **Extra Credit**

*There will be no extra credit assignments.* In most cases, there are bonus points with every quiz, as well as the final exam in this course. So, you will have a chance to make up a few points here and there during the term with bonus points. Do not ask me for extra credit assignments. They aren't going to happen.

## **Additional resources**

Throughout both the lecture and lab courses, various handouts and supplemental materials (printed & other media forms) will be made available to students to enhance topics covered in lecture.

## **Academic dishonesty:**

All assignments and tests must be your own work. Answers you write on the tests must come only from in your head or the information supplied in the test papers; anything else is cheating. The term “**cheating**” includes, but is not limited to: (1) use of any unauthorized assistance in taking quizzes, tests, or examinations, e.g., looking at other students' answers, using crib notes (including electronic), getting information from another person via any kind of communication; (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) the acquisition, without permission, of tests or other academic material belonging to a member of the University faculty or staff. If you need to use an electronic translator, you must discuss this with me in advance; or (4) the use or submission of photographic images you did not create for any assignment in this course, unless I have approved it for an example assignment.

Any cases of Academic Dishonesty will be dealt with according to university policies, which may include academic probation or expulsion.

## **Classroom courtesy: In order to cause the least disruption to your fellow learners, please:**

- Avoid coming late to class or leaving early. If you absolutely must, come in or leave quietly and take a seat near the door! If you need to go to the toilet, please wait until there is a suitable break.
- Don't talk to each other when I am lecturing. It is very rude to your fellow students (as well as to me).
- Please turn your cell phones off or to silent mode.

## Biol 430 - Spring 2016 Semester Schedule (Tentative)

Month	Tue	Thur	Thurs (Lab)
Jan		21: Class Intro, Student Survey, Light from a Physics View	Tell Us About Your Gear
	26: Light from a Photographer's view. <u>Ch 1: Gear I</u>	28: <b>Quiz 1</b> <u>Ch 1: Gear II</u>	Know Your Gear I
Feb	02: <u>Ch 2: Getting Started I</u>	04: <u>Chap 2: Getting Started II</u>	Digital Exposure Hands On
	09: <b>Quiz 2</b> <u>Ch 4: Composition I</u>	11: <u>Ch 4: Composition II</u>	Composition Hands On
	16: Ch 3: Lenses I Files, uploading, & sharing I	18: <b>Quiz 3</b> Ch 3: Lenses II Post processing, image editing I	Files, uploading, & sharing I
	23: Ethics, Art vs. Science	25: Strobes and Lighting I	Field Trip! Tripods & Landscapes
March	01: <b>Quiz 4</b> <u>Ch 4: Landscapes</u>	03: <u>Ch 5: Macro Photography</u>	Macro Photography Lab
	08: <b>Charter Day</b>	10: <b>Quiz 5</b> Guest Lecture 2	Underwater World ( <i>Alt Time</i> )
	15: Multiple Exposure Techniques (HDR, Focus Stacking)	17: Layouts, Pubs, & Posters I	Multiple Exposure Techniques (HDR, Focus Stacking)
	22: <b>Spring Break</b>	24: <b>Spring Break</b>	<b>Spring Break</b>
	29: <b>Quiz 6</b> Photomicroscopy I	31: Photomicroscopy II (EM Lab)	Photomicroscopy Lab
April	05: Layouts, Pubs, & Posters II	07: <b>Quiz 7</b> Post processing, image editing II	Fact Sheet Lab Time
	12: <u>Ch 6: Wildlife Photography</u>	14: Flowers and Plants	Wildlife Photo Lab
	19: <b>Quiz 8</b> Flowers and Plants	21: Post processing, image editing III	Flowers & Plants Lab
May	26: Nighttime & Low Light Photography	29: <b>Quiz 9</b> Guest Lecture 3	Nighttime & Low Light Photography
	03: Candid Photography	05: Lighting indoors.	Candid Photography
	10: <b>Quiz 10</b> Indoor Lighting	12: Final Exam	Indoor Lighting Lab
	13-15: <b>Final Portfolio Due</b>	<b>EXAM WEEK</b>	

**NOTE:** The above schedules and procedures in this course are subject to change in the event of extenuating circumstances.

**Class Room Etiquette:**

1. Cell phones must be turned to silent mode during class time.
2. Do not talk while the instructor is lecturing or disturb others in the classroom.
3. In the lab or field, safety is the first priority.

## **Additional Information:**

### **Computer and Software**

You will be expected to have access to a computer. A laptop is recommended so that you can bring it to class. You will need to have a copy of Adobe Light Room or Photoshop CC (or recent) installed on the computer for later in the semester. You can download a demo copy from [www.adobe.com](http://www.adobe.com). Other software may be recommended for you to download and install.

There will be times we ask you to browse the internet in class for an exercise or assignment, but doing text messages, non-class browsing or email during class time is not permitted.

### **Optional Shoots**

During the semester, optional shoots may be scheduled. The shoots are for the students to gain experience using various cameras, in the field and lab. The shoots are opportunities to work on assignments and may not serve as substitutes for the labs. You should be prepared to be in the sun for several hours--dress appropriately. You may also want drinking water, etc.

### **Reading Materials**

Readings in various books will be assigned. Copies of the text and additional reading materials will be available in ALS 317. In addition there are numerous books to browse. Please utilize these resources.

### **Online Forum**

All students will be invited to the Google+ community "UoG Sci Photo Sp 2016":  
<https://plus.google.com/u/0/communities/102011638470750688497>

This forum will be used for class discussions and posting of weekly 'assignments' as events. Only class participants and instructors will have access.

Images submitted for assignments must be submitted before the class period for which they are due. Typically, events will expire on the due date, so you should post your photos as early as possible. All images you submit will remain your own intellectual property, as long as you are the creator of that material.

<b>Course SLOs</b>	<b>Program SLOs (PLOs)</b>	<b>University SLOs (ILOs)</b>	<b>Assessment Method</b>
1. Understand the nature of light and its role in photography.	PLO 2 PLO 3	ILO 1	Exams, quizzes
2. Demonstrate the ability to use various cameras and upload, evaluate and process images.	PLO 4 PLO 5	ILO 5	Photo Assignments, portfolio, fact sheet
3. Merge and process digital images to enhance focus and interactivity.	PLO 4 PLO 5		Photo Assignments, portfolio, fact sheet
4. Given a choice of lenses, the student will be able to select an appropriate focal length to communicate their ideas.	PLO 2 PLO 5	ILO 1 ILO 3 ILO 6	Quizzes, Exams, Photo Assignments, portfolio, fact sheet
5. Students will be able to choose the appropriate shutter speed, aperture and ISO to communicate desired ideas.	PLO 2 PLO 4 PLO 5	ILO 1 ILO 2 ILO 3 ILO 6	Quizzes, Exams, Photo Assignments, portfolio, fact sheet
6. Given a photograph, the student will be able to articulate criticism regarding the image and evaluate its quality.	PLO 5 PLO 7	ILO 6	Photo Assignments
7. Use lighting techniques and post-processing to enhance images to optimize desired image information.	PLO 2 PLO 4 PLO 5 PLO 7	ILO 3 ILO 6	Photo Assignments, portfolio, fact sheet
8. Retouch an image to enhance specific objects in the image using the ethical considerations of publishing images in scientific literature.	PLO 1c PLO 1d PLO 2 PLO 4 PLO 5 PLO 7	ILO 1 ILO 3 ILO 5 ILO 6	Quizzes, Exams, Photo Assignments, portfolio, fact sheet