General Education Course Information Sheet

Please submit this sheet for each proposed course

Department & Course Number Life Science 15L

Course Title Life: Concepts and Issues – Lab Investigations

Indicate if Seminar and/or Writing II course n/a

1 Check the recommended GE foundation area(s) and subgroups(s) for this course

Foundations of the Arts and Humanities

- Literary and Cultural Analysis
- Philosophic and Linguistic Analysis
- Visual and Performance Arts Analysis and Practice

Foundations of Society and Culture

- Historical Analysis
- Social Analysis

Foundations of Scientific Inquiry

- Physical Science

  With Laboratory or Demonstration Component must be 5 units (or more)
- Life Science

  With Laboratory or Demonstration Component must be 5 units (or more) **X (w/LS15)**

2. Briefly describe the rationale for assignment to foundation area(s) and subgroup(s) chosen.

LS15L will consist of four inquiry-based lab investigations on topics in biology covered in LS15 (in which students must be concurrently enrolled). Each investigation will require students to develop hypotheses, collect and analyze data and present their findings and interpretations.

3. "List faculty member(s) who will serve as instructor (give academic rank):
Jay Phelan, Ph.D. Academic Administrator

Do you intend to use graduate student instructors (TAs) in this course? Yes X No ____

If yes, please indicate the number of TAs 3

4. Indicate when do you anticipate teaching this course over the next three years:

2013-2014	Fall		Winter		Spring		
	Enrollment		Enrollment		Enrollment		
2014-2015	Fall	X	Winter		Spring		
	Enrollment	150	Enrollment		Enrollment		
2015-2016	Fall	X	Winter		Spring		
	Enrollment	150	Enrollment		Enrollment		

5. GE Course Units

Is this an ***existing*** course that has been modified for inclusion in the new GE? Yes X No ____

If yes, provide a brief explanation of what has changed. LS15 is an existing course. It satisfies the "Foundations of Scientific Inquiry, Life Science" requirement. LS15L is a new course. It is an optional addition to LS 15. Student may take it concurrently with LS15, in which case they will also receive "with lab" credit.

Present Number of Units: ____ Proposed Number of Units: 1

6. Please present concise arguments for the GE principles applicable to this course.

❑ General Knowledge	Students will read original research literature and extensive background information on diverse topics in biology in preparation for developing their own testable hypotheses. These materials will cover specific data *and* experimental approaches to hypothesis testing as well as data analysis and interpretation.
❑ Integrative Learning	In developing/testing hypotheses, students will incorporate data, theoretical perspectives, and experimental approaches from several disciplines in biology (i.e., physiology & nutrition, biodiversity & ecology, anatomy & phylogenetics) and integrate them to address issues with practical and personal relevance.
❑ Ethical Implications	n/a
❑ Cultural Diversity	n/a
❑ Critical Thinking	In developing their own hypotheses and analyzing and presenting results, students will be required to consider alternative explanations for their observations, question the quality or generalizability of their information, and evaluate assumptions, and potential biases.
❑ Rhetorical Effectiveness	In written and oral assignments, students must present a concise and precise rationale for their hypotheses. In their analyses, they must persuasively articulate and support their conclusions and the associated uncertainty relative to the alternative interpretations.
❑ Problem-solving	Students will have several data collection tools available but must determine the best methods for collecting data appropriate for testing their hypotheses. They must evaluate their controls, the uncertainties in their data, and the significance of such uncertainty.
❑ Library & Information Literacy	In written and oral presentations, students must present their interpretations and conclusions in the style and format of original research literature. This will necessitate identifying/acquiring the relevant literature and its relevance for their own hypotheses.

(A) STUDENT CONTACT PER WEEK (if not applicable write N/A)

1.	Lecture:		(hours)
2.	Discussion Section:		(hours)
3.	Labs:	**2**	(hours)
4.	Experiential (service learning, internships, other):		(hours)
5.	Field Trips:		(hours)
	(A) TOTAL Student Contact Per Week	**2**	**(HOURS)**

(B) OUT-OF-CLASS HOURS PER WEEK (if not applicable write N/A)

1.	General Review & Preparation:	**5 (per 10 weeks)**	(hours)
2.	Reading	**3 (per 10 weeks)**	(hours)
3.	Group Projects:	**6 (per 10 weeks)**	(hours)
4.	Preparation for Quizzes & Exams:	**n/a**	(hours)
5.	Information Literacy Exercises:	**n/a**	(hours)
6.	Written Assignments:	**6 (per 10 weeks)**	(hours)
7.	Research Activity:	**n/a**	(hours)
	(B) TOTAL Out-of-class time per week	**20 (per 10 wks)**	**(HOURS)**
	GRAND TOTAL (A) + (B) must equal at least 15 hours/week	**~4 (per week)**	**(HOURS)**

Life Sciences 15L

Life: Concepts and Issues
Lab Investigations

Syllabus

Enrollment Information and Requirement

Life Science 15L is an optional addition to Life Science 15. It is a 1-unit course and, when completed with LS15, satisfies the general education requirement "Foundations of Scientific Inquiry for Life Science with a Laboratory Component."

Enrollment in LS15L requires concurrent enrollment in Life Science 15, "Life: Concepts and Issues." [Note: enrollment in LS15 only (without LS15L) is permitted, and satisfies the general education requirement for "Foundations of Scientific Inquiry" for Life Sciences.]

LS15L meets for one two-hour period each week and consists of four inquiry-based lab investigations. Each of these covers one to three weeks. Class meeting time will be devoted to each of several important components of the exercises, including development of hypotheses, the collection and analyses of data, and class presentations of results and interpretations.

Course Description

Science touches our lives everyday. Now more than ever, biology is influencing and even transforming our lives. Its increasing relevance is clear in a multitude of areas, including modern genetics & biotechnology, nutrition & health, and brain functioning & behavior. Maybe you've pondered questions such as these:

* Does the radiation released by cell phones cause brain tumors?
* Do vitamin supplements reduce the likelihood of getting a cold?
* How does caffeine work?
* What's the difference between saturated and unsaturated fats?
* What is "blood doping," and how does it improve athletic performance?

In Life Science 15, we investigate these topics and many others--including evolution and biodiversity, genetics, nutrition, reproduction, endocrinology, and neurobiology. But we go beyond the facts, ideas, and important questions. Biology (and science in general) is more than that. It is an intellectual activity, encompassing observation, experimentation, and explanation of natural phenomena. It is a pathway to discover and better understand our world.

Consider a single powerful question that underlies scientific thinking: ***"How do you know that is true?"*** Once you begin asking this question—of others and of yourself—you are on the road to a better understanding of the world.

This question is our focus in Life Science 15L. Drawing on content from Life Science 15, we will conduct hands-on exercises to investigate several important biological phenomena. And in the course of our specific investigations, we will learn the tools of scientific thinking, including generating and testing hypotheses, analyzing and interpreting data, and drawing conclusions.

AIMS AND OBJECTIVES

The focus of the labs is on inquiry. Our three primary goals are to:

1) understand how scientists "do" science,
2) develop critical thinking skills with respect to data interpretation and analysis, and
3) recognize the impact of scientific inquiry and LS15 course content on your life.

Process of science. Each lab is a hands-on exercise beginning with instruction in how to conceive and articulate, as well as refine, testable hypotheses. You will develop hypotheses as you explore how to design feasible and logical experiments that are sufficiently controlled to enable you to draw justifiable conclusions. You will also learn to identify the uncertainties that are likely to be associated with your methods and analyses.

Critical thinking in data interpretation and analysis. Each of the exercises is designed to illuminate the complexities associated with collecting, examining and interpreting quantitative data. You will determine the best methods for acquiring the appropriate data for testing your hypotheses. In doing so, you will consider the varying degrees of control in your methods and measurements. You also will explore the idea of uncertainty in the scientific process. This includes identifying and articulating the sources of uncertainty in your experiments and the extent to which that uncertainty undermines or constrains the conclusions you are able to draw. In your presentations--both individual and collaborative--of your experiments and results, the emphasis will be on your articulation of testable hypotheses, your methods of analysis, and the appropriateness of your conclusions.

Impact on your life. You encounter scientific information and claims throughout your life. It is essential that you--as consumers, voters, and parents--are able to evaluate scientific information critically. These lab investigations, including articulating testable hypotheses and evaluating data critically, will help you as you gain scientific literacy.

SCHEDULE AND DESCRIPTION OF LAB EXERCISES

Microbial Diversity in Your World

WEEK	ACTIVITY
1	* *introduction and methods*
2	* *data collection*
3	* *analysis of results; (group presentations during Week 4)*

In this lab, you will develop and test hypotheses about the density and diversity of microbes in different locations in your world. You will collect microbial samples and evaluate bacterial growth and diversity on Petri dishes following 7 days incubation.

You will develop and test your own hypotheses about the relative abundance and diversity of microbes in different locations, such as cell phone keypads, public computer

keyboards, ATM keypads, elevator buttons, cafeteria trays, public restroom sinks and toilet seats, dorm showers, desks, shoe soles, etc.

Environmental Influences on Stress Hormones and Their Implications for Behavior and Physiology.

WEEK	ACTIVITY
4	* *introduction and methods*
5	* *data collection*
6	* *analysis of results*

In this lab, you will develop and test hypotheses about the impact of stress-inducing situations on levels of circulating cortisol and the consequences for cognitive and physical performance. You will prepare salivary samples for cortisol assays, collect and analyze data from a variety of computer-based tests.

You will develop and test hypotheses relating to the magnitude of changes in salivary cortisol levels resulting from short- and long-term stressors and stress-reducing situations (completion of tasks inducing high cognitive load, high/low intensity resistance exercise, meditation, academic responsibilities); and/or the impact of sleep deprivation and nutrition on cortisol levels.

Nutrition & Digestion: Blood Sugar Influences on Cognitive and Physical Performance.

WEEK	ACTIVITY
7	* *introduction and methods*
8	* *data collection*
9	* *analysis of results*

In this lab, you will develop and test hypotheses about the impact of low vs. high blood sugar on a variety of cognitive and physical tasks.

Potential hypotheses that you may test include: magnitude of performance differences on cognitive and physical tasks during high and low blood sugar situations; estimating the consequences of skipping a meal prior to an exam; evaluating the impact of foods with varying glycemic index values on the speed/duration of blood sugar changes.

Investigating Brain Structure and Function - Dissecting the Sheep Brain.

WEEK	ACTIVITY
10	* *introduction, dissection, and data collection*

In this lab, you will develop and test hypotheses about the relationship between structure and function in the sheep brain. Dissecting a sheep brain, you will identify and measuring numerous brain structures.

Potential hypotheses that you may test include: the size (absolute and relative to overall brain size and/or body size) of sheep brain structures with published data and digital representations from other brains, including human, monkey, and cat; comparisons can

include features/structures such as the hemispheres, corpus callosum, folding, and ratios of gray to white matter; comparisons can also make reference to behavioral and physiological correlates, including language, and olfactory and visual proficiency.

ASSIGNMENTS

You will be assessed based on your performance on the following work:

* Lab Investigation #1: Microbial Diversity in Your World
  20 pts - **Group poster/oral presentation** (Poster: 24" x 36". Oral presentation: 3 min.)

* Lab Investigation #2: Environmental Influences on Stress Hormones and Their Implications for Behavior and Physiology.
  25 pts - **Group written lab report** (3-5 pages)

* Lab Investigation #3: Nutrition & Digestion: Blood Sugar Influences on Cognitive and Physical Performance.
  35 pts - **Individual written lab report** (3-5 pages)

* Lab Investigation #4: Brain Structure and Function - Dissecting the Sheep Brain.
  20 pts - **Group poster presentation** (Poster: 24" x 36")

---

100 pts • Total Points Possible

Note: For the assignments above, you should include your hypotheses, a brief description of your methods (including your control groups) with your rationale for choosing them, a visual display of your results and analyses, your conclusions, and a discussion of the sources of uncertainty in your experiments and the extent to which that uncertainty undermines or constrains the conclusions you are able to draw.

REQUIRED READINGS / MATERIALS

Life Sciences LS15L, Life: Concepts and Issues. Laboratory Investigations. Hayden McNeil

In addition to instructions on specific methods, the lab manual will include a collection of excerpts and articles on original research to guide you as you develop hypotheses. These will include:

Dawson, P. et al. 2007. Residence time and food contact time effects on transfer of *Salmonella typhimurium* from tile, wood and carpet: testing the five-second rule. *J. Appl. Microbiol.* 102(4): 945-53.

Feazel LM, Baumgartner LK, Peterson KL, Frank DN, Harris JK, et al. 2009. Opportunistic pathogens enriched in showerhead biofilms. *Proc. Natl. Acad. Sci. USA* 106: 16393–16399.

Flores GE, Bates ST, Knights D, Lauber CL, Stombaugh J, et al. 2011. Microbial biogeography of public restroom surfaces. *PLoS ONE 6: e28132.* doi:10.1371/journal.pone.0028132.

Hewitt KM, Gerba CP, Maxwell SL, and Kelley ST. 2012. Office space bacterial abundance and diversity in three metropolitan areas. *PLoS ONE 7(5): e37849.* doi:10.1371/journal.pone.0037849.

Hlebowicz J, Wickenberg J, Fahlström R., Björgell O, Almér L, and Darwiche G. 2007. Effect of commercial breakfast fibre cereals compared with corn flakes on postprandial blood glucose, gastric emptying and satiety in healthy subjects: a randomized blinded crossover trial. *Nutrition Journal*, 6:22-9.

Kirschbaum C. et al. 1993. The 'Trier social stress test' – a tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology* 28:76-81.

Kirschbaum C, Hellhammer DH. 1994. Salivary cortisol in psychoneuroendocrine research: recent developments and applications. *Psychoneuroendocrinology* 19:313-33.

Kirschbaum C, Wolf OT, May M, Wippich M, Hellhammer DH. 1996. Stress- and treatment-induced elevations of cortisol levels associated with impaired declarative memory in healthy adults. *Life Sci.* 58:1475-83.

McGuigan MR, Egan AD, Foster C. 2004. Salivary cortisol responses and perceived exertion during high intensity and low intensity bouts of resistance exercise. *J. Sports Science Med.* 3:8-15.

Michaels R, Parra J, McCann DS, Vander AJ. 1979. Renin, cortisol, and aldosterone during transcendental meditation. *Psychosomatic Med.* 41:50-4.

O'Connor PJ, Corrigan DL. 1987. Influence of short-term cycling on salivary cortisol levels. *Medicine and Science in Sports and Exercise* 19:224-8.

Sumioka H, Nakae A, Kanai R, Ishiguro H. 2013. Huggable communication medium decreases cortisol levels. *Nature Scientific Reports 3034.* doi: 10: 1038/srep03034.

Williams RA et al. 2004. Trier social stress test: a method for use in nursing research. *Nursing Res.* 53(4): 277-80.

Van Den Berg J. Neely G. 2006. Performance on a simple reaction time task while sleep deprived. *Perceptual and Motor Skills,* 102:589-599.

LAB SAFETY & PERSONAL PROTECTIVE EQUIPMENT

Safety in the lab is of paramount importance. All labs on campus must comply with UCLA policies and procedures.

All of the lab meetings are held in a lab room, where lab attire is required (see below). In order to participate in the labs, you must also have passed the LS Core Labs required lab safety training. If you are attempting to enroll in the course, contact the Lab Safety Officer via email (rachels@lifesci.ucla.edu) in order to gain guest CCLE access so you can take the quiz before coming to the first lab meeting.

Before coming to your first lab meeting, you must:

1. Watch the LS Core Labs Safety Video (http://lslab.lscore.ucla.edu/LAB/Safety/). There are two parts to the safety video, each about 10 minutes long.

2. Review the information provided on the lab safety section of the LS15L CCLE site.

3. Pass the lab safety quiz available on the lab safety section of the LS15L CCLE site. You are allowed three attempts to pass. You must also complete the electronic signature at the end of the quiz.

Proper laboratory attire is required at all times. In accordance with UCLA Policy 905, while in a designated lab room your legs and feet must be completely covered by long pants/skirt and closed toe shoes. No skin can be exposed on the lower half of the body. Pants cannot have rips that expose the skin. Thick cotton leggings are permitted but tights or pantyhose are not acceptable as they don't provide an adequate barrier in the event of a chemical splash. If you are wearing shoes that expose any portion of your foot or ankle when you are standing OR sitting, you must wear full length socks to lab.

Your TA cannot allow you to come into the lab room if you are not dressed properly. We are subject to drop-in safety inspections; a violation can shut down our labs for everyone. There will be no warnings. Lab attire is a zero-tolerance policy. Students who do not comply will not be allowed to enter the lab room and will not be granted a make-up lab.

No food or drink can be consumed in the lab rooms. In addition, no food or drink waste may be disposed of in the lab trash cans. You are permitted to carry food or drink with you only if it remains zipped inside a backpack the entire time you are in the room.

Additional personal protective equipment, including a lab coat, must be worn whenever chemicals are present in the room. It must button fully and the sleeves must be full length (to the wrist). There are no loaner coats available and you will not be allowed to attend lab if you do not have your coat. You are responsible for bringing your own lab coat each week. Lab coats can be purchased from the AXE chemistry fraternity (located in 1275 Young Hall), at Scrubs Unlimited (located at 10930 Weyburn Ave in Westwood Village) or at the Health Sciences Store on campus. Gloves will be provided in the laboratory, as necessary.

If you have questions about lab attire and requirements, please review UCLA Policy 905, available online. http://www.adminpolicies.ucla.edu/pdf/905.pdf

Life Science 15. *Life: Concepts and Issues*

Proposal for LS15L: An optional laboratory course to accompany LS15

9 December 2013

Course Description

LS15 is a 5-unit course for non-science majors. It meets for three hours of lecture and one two-hour discussion section each week. The course is a broad introduction to biology, with a focus on scientific literacy and scientific thinking. The lecture topics vary, but typically include the following.

1. ***Scientific Thinking and Decision-Making***
2. ***Evolution and Genetics, Nature & Nurture***
3. ***Physiology: Chemistry, Nutrition, Reproduction, Endocrinology, and Neurobiology***
4. ***Human Behavioral Biology***

720 students enrolled in LS15 during 2012-2013. We expect more than this during 2013-14. There are 12 discussion sections, offered on Tuesday/Wednesday/Thursday. Each TA oversees three sections and each section enrolls 24 students.

Completion of LS15 satisfies the UCLA College of Letters and Science general education requirement for "Foundations of Scientific Inquiry" for Life Sciences.

Proposed Change

We are proposing a new course, Life Science 15L, which is an optional addition to Life Science 15. LS15L will be a 1-unit course and, when completed with LS15, will allow students to satisfy the "Foundations of Scientific Inquiry" for Life Science with a Laboratory Component.

To enroll in LS15L a student must concurrently enroll in LS15. Enrollment in LS15 only, however, is permitted, and will continue to satisfy the general education requirement for "Foundations of Scientific Inquiry" for Life Sciences.

Overview of LS15L

LS15L will meet for one two-hour period each week and will consist of four inquiry-based lab investigations. Each of these will cover two to three weeks. Class time will be devoted to each of several important components of the exercises, including student development of hypotheses, the collection and analyses of data, and class presentations of results and interpretations. Students will be assessed based on three group write-ups/presentations, and one individual written report.

Aims and Objectives

The focus of the labs is on inquiry. Our three primary goals are to help students to:

1) understand how scientists "do" science,
2) develop critical thinking skills with respect to data interpretation and analysis, and
3) recognize the impact of scientific inquiry and specific LS15 course content on their lives.

Process of science. Each lab will be a hands-on exercise beginning with instruction in how to conceive and articulate, as well as refine, testable hypotheses. This part of the exercises will include extensive discussion about numerous aspects of hypothesis formation. They will develop their hypotheses as they consider how to design feasible and logical experiments that will be sufficiently controlled to enable the students to draw justifiable conclusions. They will also identify the uncertainties that are likely to be associated with their methods and analyses.

Critical thinking in data interpretation and analysis. Each of the exercises will be designed to illuminate the complexities associated with examining and interpreting quantitative data. Students will determine the best methods for collecting the appropriate data for testing their hypotheses. In doing so, they will consider the varying degrees of control in their methods and measurements. They will also explore the idea of uncertainty in the scientific process. This will include identifying and articulating the sources of uncertainty in their experiments and the extent to which that uncertainty undermines or constrains the conclusions they are able to draw. In their presentations of their experiments and results, the emphasis will be on their articulation of testable hypotheses, their methods of analysis, and the appropriateness of their conclusions.

Impact on their lives. Even as non-science majors, students will encounter scientific information and claims throughout their lives. It will be essential for them—as consumers, voters, and parents—to be able to evaluate scientific information critically. The exercises here, particularly the exposure to articulating testable hypotheses and evaluating data critically, will help them as they gain scientific literacy.

Further, in LS15L students will encounter numerous specific ideas with direct relevance to their lives:

1) They will be learn that there is the possibility of coming in contact with a huge amount of microbial diversity during their daily lives, and that locations vary in predictable ways with respect to the abundance and diversity of microbes they host. ATM keypads and public restroom sinks host more, for example, while public restroom toilet seats, currency, and most door knobs host less.

2) They will discover that variation in blood sugar levels can be great and that there is a dramatic negative impact of low blood sugar on memory and grammatical reasoning. (This will likely influence their future eating behavior prior to exams.)

3) They will note that commonly encountered situations in their lives can lead to a stress response that includes measurable cortisol release. They will also observe that such stress responses can have significant impact on aspects of their cognitive and physical performance, from reaction time and grip strength to short-term memory.

Specific Details about the Lab Exercises

1. Microbial Diversity in Your World

Students will develop and test hypotheses about the density and diversity of microbes in different locations in their world.

Techniques: conducting microbial sampling with air plates and by swabbing surfaces; evaluating bacterial growth and diversity on Petri dishes, following 7 days incubation.

Potential hypotheses students may test: relative abundance and diversity of microbes in different locations, including cell phone keypads, public computer keyboards, ATM keypads, elevator buttons, cafeteria trays, public restroom sinks and toilet seats, dorm showers, men's vs. women's desks, shoe soles, etc.

2. Nutrition & Digestion: Blood Sugar Influences on Cognitive and Physical Performance.

Students will develop and test hypotheses about the impact of low vs. high blood sugar on a variety of cognitive and physical tasks.

Techniques: collecting finger-prick blood samples, utilizing hand-held digital blood glucose meters; using and analyzing results from computer-based measures of reaction time, grammatical reasoning (Baddeley's grammatical reasoning test), short-term number memory (Sternberg Memory Task), rapid visual information processing, grip strength. heart rate recovery time.

Potential hypotheses to test: magnitude of performance differences on cognitive and physical tasks during high and low blood sugar situations—such as those associated with skipping a meal prior to an exam; impact of foods with varying glycemic index values on the speed and duration of blood sugar changes.

3. Environmental Influences on Stress Hormones and Their Implications for Behavior and Physiology.

Students will develop and test hypotheses about the impact of stress-inducing environmental variables on levels of circulating cortisol and the consequences for cognitive and physical performance.

Techniques: collecting salivary samples for cortisol assays (which will be conducted by UCLA's Clinical and Translational Research Center); using and analyzing results from computer-based measures on tests of object and word memory, mental rotation tasks; using a standard psychological stress protocol (the Trier Social Stress Test, TSST).

Potential hypotheses to test: magnitude of changes in salivary cortisol levels resulting from short- and long-term stressors and stress-reducing situations (short term: completion of tasks inducing high cognitive load, including the TSST, high/low intensity resistance exercise, meditation, tactile stimulation, playing competitive vs. non-competitive video games; longer term: academic responsibilities, including high-stakes exams); impact of sleep deprivation and nutrition on cortisol levels; impact of stress on competitive and cooperative interactions, including the ultimatum game.

4. Investigating Brain Structure and Function – Dissecting the Sheep Brain.

Students will develop and test hypotheses about the relationship between structure and function in the sheep brain. They will become familiar with overall brain anatomy, with special focus on the limbic system and structures with language-related functions in humans.

Techniques: dissecting a sheep brain; identifying, isolating, and measuring brain structures, including dura mater, pia mater, cerebral cortex, cerebellum, brain stem, the lobes, corpus callosum, optic chiasm, pituitary gland, hypothalamus, thalamus, pineal gland, olfactory bulb and cortex, limbic cortex, cerebellum, hippocampus, and amygdala.

Potential hypotheses to test: size (absolute and relative to overall brain size and/or body size) of sheep brain structures with published data and digital representations from other brains, including human, monkey, cat, rat, rabbit, squirrel, and frog brains; comparisons can include features/structures such as the hemispheres, corpus callosum, cortical folding, ratios of gray to white matter, the demarcation of structures, and the presence or absence of structures, such as the neocortex; comparisons can also make reference to behavioral and physiological correlates, including language, and olfactory and visual proficiency.

Data and Observations from Pilot Studies of the Lab Exercises

1. Microbial Diversity in Your World

Observations

The samples with the highest presence of microbes were:

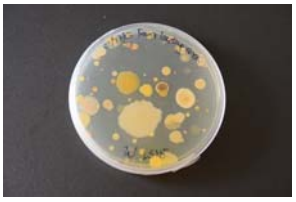
public bathroom sink area, public computer keyboard, ATM keypad, cell phone,

Few microbes were observed on plates collected from:

door handle, book, treadmill handle, currency, drinking fountains

Note the following plates, following 7 days incubation:

Franz loading dock– 20 minutes exposure



Ackerman public restroom sink area swab

Ackerman public restroom, toilet seat swab

Shoe sole swab

Ackerman ATM keypad swab

$10 bill

Car door handle swab

---

2. Nutrition & Digestion: Blood Sugar Influences on Cognitive and Physical Performance

Low blood sugar reading: (after 15 hours of fasting (no caffeine)): average = 79 mg/dl.
High blood sugar reading: (20 minutes after serving of orange juice or corn flakes): average = 111 mg/dl.

Grammatical Reasoning Scores:

low blood sugar:	latency: 3.4 sec ± 1.4	***worse performance at low blood sugar***
higher blood sugar:	latency: 2.9 sec ± 0.9	***(but high variance)***

Rapid Visual Information Processing (RVIP test)

low blood sugar:	84.3%	***worse performance at low blood sugar***
higher blood sugar:	93.8%	

Reaction Time (average)

low blood sugar:	309ms ± 3.5	***worse performance at low blood sugar***
higher blood sugar:	292ms ± 2.1	

Grip Strength (maximum)

low blood sugar:	223 N ± 8	***worse performance at low blood sugar***
higher blood sugar:	244 N ± 13	

3. Environmental Influences on Hormones and Their Implication for Behavior and Physiology.

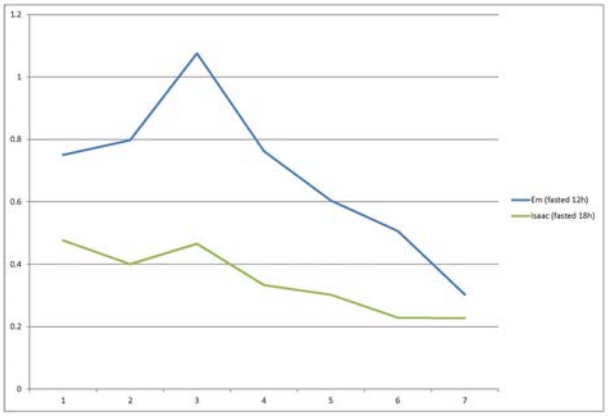


Figure 1: Cortisol was measured at 15-minute intervals. At time point 2, a stressor (the Trier Social Stress Test) was applied.
Green line is for subject who has fasted for 18 hours.
Blue line is for subject who has not fasted.

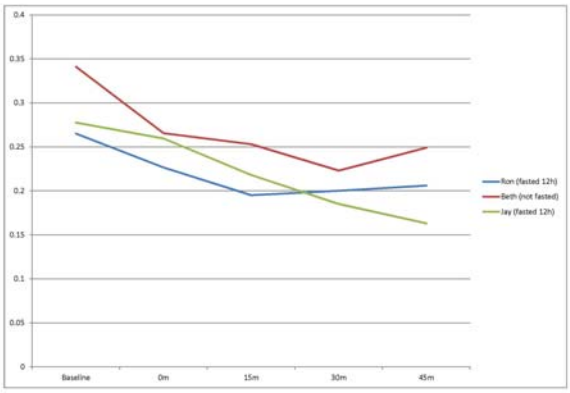


Figure 2: Cortisol was measured during same 15-minute intervals, with no stressor applied.
Green line is for subject who has fasted for 18 hours.
Blue line is for subject who has not fasted.

Interpreting, Analyzing, and Presenting Data in Graphical Form

Every laboratory exercise write-up will include at least one presentation of some data in a graphical form. During the laboratory meetings and in the laboratory manual, students will receive instruction in the interpretation, evaluation, and presentation of quantitative data. This will guide them as they acquire and improve their abilities to think critically about the data they collect and how best to present those data visually.

Instruction in the Visual Display of Quantitative Information

Some of the issues and questions that will be covered in this instruction include:

General issues about graphs:

What are tables and graphs? What are they used for?
- organizing information
- showing patterns and relationships
- reporting findings from research
- supporting an argument or point of view

* What types of data figures are most common?
  - bar graphs, scatterplots, line graphs, pie charts

* Is there a proper way to read a graph?

* What is a "variable"?
  - What are the differences between categoric variables, discrete variables, and continuous variables.

* What are the axes of a graph? How should they be labeled?

What data are represented on the x and y coordinates?
What is an independent variable?
What is a dependent variable?
How is the scale determined?

* How can variation be conveyed?

* When are absolute amounts reported versus relative amounts?
What is a "rate of change"? How does it differ from an absolute amount?

Questions that will be asked of students about their data presentation include:

* "What can a reader conclude from your figure?"
Must they use interpolation? extrapolation?
How have you conveyed certainty or uncertainty about your results?

* "What additional information would make this figure more helpful? Why?"

* "What is the purpose of the graph?"

* "What is the title of the graph. What information is presented?

* Can you alternate the axes on your graph? Would that change your interpretation?

* "Does your figure reveal a trend? What does that mean?

* Can you extract a particular "answer" from the graph.

* How might you help a reader to interpret a graph?
highlighting differences
identifying control groups and experimental groups
indicating differences in treatments
identify any trends and relationships revealed by the data.

Some references used in the development of the laboratory exercises:

Bliss CB. 1893. Investigations in reaction-time and attention. *Studies from the Yale Pyschological Laboratory*, 1:1-55.

Dawson, P. et al. (2007) Residence time and food contact time effects on transfer of Salmonella typhimurium from tile, wood and carpet: testing the five-second rule. *J Appl. Microbiol.* 102(4): 945-53.

Feazel LM, Baumgartner LK, Peterson KL, Frank DN, Harris JK, et al. 2009. Opportunistic pathogens enriched in showerhead biofilms. *Proc. Natl. Acad. Sci. USA* 106: 16393–16399.

Flores GE, Bates ST, Knights D, Lauber CL, Stombaugh J, et al. 2011. Microbial biogeography of public restroom surfaces. *PLoS ONE* 6: e28132. doi: 10.1371/journal.pone.0028132.

Hanninen H. 1971 Psychological Picture of Manifest and Latent Carbon Disulphide Poisoning. *British Journal of Industrial Medicine*, 28:374-381.

Hewitt KM, Gerba CP, Maxwell SL, and Kelley ST. 2012. Office space bacterial abundance and diversity in three metropolitan areas. *PLoS ONE* 7(5): e37849. doi:10.1371/journal.pone.0037849.

Hlebowicz J, Wickenberg J, Fahlström R., Björgell O, Almér L, and Darwiche G. 2007. Effect of commercial breakfast fibre cereals compared with corn flakes on postprandial blood glucose, gastric emptying and satiety in healthy subjects: a randomized blinded crossover trial. *Nutrition Journal*, 6:22-9.

Kirschbaum C. et al. 1993. The 'Trier social stress test' – a tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology* 28:76-81.

Kirschbaum C, Hellhammer DH. 1994. Salivary cortisol in psychoneuroendocrine research: recent developments and applications. *Psychoneuroendocrinology* 19:313-33.

Kirschbaum C, Wolf OT, May M, Wippich M, Hellhammer DH. 1996. Stress- and treatment-induced elevations of cortisol levels associated with impaired declarative memory in healthy adults. *Life Sci.* 58:1475-83.

McGuigan MR, Egan AD, Foster C. 2004. Salivary cortisol responses and perceived exertion during high intensity and low intensity bouts of resistance exercise. *J. Sports Science Med.* 3:8-15.

Michaels R, Parra J, McCann DS, Vander AJ. 1979. Renin, cortisol, and aldosterone during transcendental meditation. *Psychosomatic Med.* 41:50-4.

Murray MM, Foxe JJ, Higgins BA, Javitt DC, Shroeder CE. 2001. Visuo-spatial neural response interactions in early cortical processing during a simple reaction time task: a high-density electrical mapping study. *Neuropsychologia*, 39:828-844.

O'Connor PJ, Corrigan DL. 1987. Influence of short-term cycling on salivary cortisol levels. *Medicine and Science in Sports and Exercise* 19:224-8.

Simon JR. 1967. Ear Preference in a Simple Reaction-Time Task. *J. Exp. Psychology* 75:49-55.

Sumioka H, Nakae A, Kanai R, Ishiguro H. 2013. Huggable communication medium decreases cortisol levels. *Nature Scientific Reports* 3034. doi: 10: 1038/srep03034.

Teichner WH. 1954. Recent Studies of Simple Reaction Time, *Psychological Bulletin*, 51:128-149.

Williams RA et al. 2004. Trier social stress test: a method for use in nursing research. *Nursing Res.* 53(4): 277-80.

Van Den Berg J. Neely G. 2006. Performance on a simple reaction time task while sleep deprived. *Perceptual and Motor Skills*, 102:589-599.

UCLA Course Inventory Management System

Main Menu | Inventory | Reports | Help | Exit

New Course Proposal

	Life Sciences 15L **Life: Concepts and Issues Laboratory**
Course Number	**Life Sciences 15L**
Title	**Life: Concepts and Issues Laboratory**
Short Title	**LIFE SCIENCE 15L**
Units	Fixed: **1**
Grading Basis	**Letter grade only**
Instructional Format	**Laboratory - 2 hours per week**
TIE Code	**LABS - Laboratory (Skills/Techniques) [T]**
GE Requirement	**Yes**
Major or Minor Requirement	**Yes**
Requisites	**Concurrent enrollment with LS 15.**
Course Description	**The focus of the labs is on inquiry. Our three primary goals are to help students to:** **1) understand how scientists "do" science,** **2) develop critical thinking skills with respect to data interpretation and analysis, and** **3) recognize the impact of scientific inquiry and specific LS15 course content on their lives.**
Justification	**LS15 is a 5-unit course for non-science majors. It meets for three hours of lecture and one two-hour discussion section each week. The course is a broad introduction to biology, with a focus on scientific literacy and scientific thinking. The lecture topics vary, but typically include the following.** **1. Scientific Thinking and Decision-Making** **2. Evolution and Genetics, Nature & Nurture** **3. Physiology: Chemistry, Nutrition, Reproduction, Endocrinology, and Neurobiology** **4. Human Behavioral Biology** **720 students enrolled in LS15 during 2012-2013. We expect more than this during 2013-14.** **There are 12 discussion sections, offered on Tuesday/Wednesday/Thursday. Each TA oversees three sections and each section enrolls 24 students. Completion of LS15 satisfies the UCLA College of Letters and Science general education requirement for "Foundations of Scientific Inquiry" for Life Sciences.**
Syllabus	File *Proposal for Life Science 15L - December 2013.pdf* was previously uploaded. You may view the file by clicking on the file name.
Supplemental Information	**LS15L will meet for one two-hour period each week and will consist of four inquiry-based lab investigations. Each of these will cover two to three weeks. Class time will be devoted to each of several important components of the exercises, including student development of hypotheses, the collection and analyses of data, and class presentations of results and interpretations. Students will be assessed based on three group write-**

	ups/presentations, and one individual written report.
Grading Structure	**A letter grade will be assigned.**
Effective Date	**Spring 2014**
Instructor	Name: **Jay Phelan, Ph.D.** Title: **Lecturer**
Quarters Taught	☑ Fall ☑ Winter ☑ Spring ☐ Summer
Department	**Life Sciences**
Contact	Name: **TRACY KNOX** E-mail: **tracyn@lifesci.ucla.edu**
Routing Help	

ROUTING STATUS

Role:	Dean College/School or Designee - Hwang, Sandra (SHWANG@COLLEGE.UCLA.EDU) - 54673
Status:	Pending Action

Role:	FEC School Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 1/9/2014 3:06:10 PM
Changes:	No Changes Made
Comments:	Routing to Sandra Hwang for Dean Sork's approval.

Role:	Department/School Coordinator - Knox, Tracy L (TRACYN@LIFESCI.UCLA.EDU) - 58445
Status:	Approved on 1/8/2014 9:40:30 PM
Changes:	No Changes Made
Comments:	Tracy Knox, MSO on behalf of the LS Core Chair, Frank Laski, PhD

Role:	FEC School Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 1/8/2014 3:31:32 PM
Changes:	No Changes Made
Comments:	Routing to Tracy. See Dean's comment below.

Role:	Dean College/School or Designee - Hwang, Sandra Se Mi (SHWANG@COLLEGE.UCLA.EDU) - 54673
Status:	Returned for Additional Info on 1/8/2014 3:22:14 PM
Changes:	No Changes Made
Comments:	Please change the title of the instructor before approval. We will approve after the instructor title is changed.

Role:	L&S FEC Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 12/20/2013 1:19:37 PM
Changes:	No Changes Made
Comments:	Routing to Sandra Hwang for Dean Sork's approval.

Role:	Department/School Coordinator - Knox, Tracy L (TRACYN@LIFESCI.UCLA.EDU) - 58445
Status:	Approved on 12/17/2013 11:25:25 AM
Changes:	Course Number, Concurrent Course, Grading Basis
Comments:	Tracy Knox, on behalf of Frank Laski, Chair, LS Core

Role:	L&S FEC Coordinator - Castillo, Myrna Dee Figurac (MCASTILLO@COLLEGE.UCLA.EDU) - 45040
Status:	Returned for Additional Info on 12/17/2013 11:15:21 AM
Changes:	No Changes Made
Comments:	Routing back to Tracy. See the following concerns: 1.) All new course proposals should note Chair approval. 2.) The "C" prefix can only be used when an undergraduate level course is concurrently listed with a graduate level course. 3.) Aside

	from an LS Core staff member doing manual routine audits, there is no way to enforce concurrent enrollment in LS15 and LS15L. Please contact me with any questions.

Role:	Initiator/Submitter - Knox, Tracy L (TRACYN@LIFESCI.UCLA.EDU) - 58445
Status:	Submitted on 12/17/2013 9:37:20 AM
Comments:	Initiated a New Course Proposal

Back to Course List
