BIOL 404L

California State University San Marcos • NEW COURSE • FORM C

ORIGINATOR'S SECTION:

1. College:

☐ **CHABSS** ☐ **CoBA**
☐ **CoEHHS** ☒ **CSM**

Desired Term and Year of Implementation (e.g., Fall 2008):

Spring 2018

2.Course is to be considered for G.E.? (If yes, also fill out appropriate GE form*) ☐ Yes ☒ No

3. Course will be a variable-topics (generic) course? ☐ Yes ☒ No
("generic" is a placeholder for topics)

4. Course abbreviation and Number:* BIOL 404L

5. Title: ***(Titles using jargon, slang, copyrighted names, trade names, or any non-essential punctuation may not be used.)***
Developmental Physiology Lab

6. Abbreviated Title for PeopleSoft:
(no more than 25 characters, including spaces)
Dev Physiol Lab

7. Number of Units: 1

8. Catalog Description: ***(Not to exceed 80 words; language should conform to catalog copy. Please consult the catalog for models of style and format; include all necessary information regarding consent for enrollment, pre- and/or corequisites, repeated enrollment, crosslisting, as detailed below. Such information does not count toward the 80-word limit.)***

Provides hands-on experience with experimental techniques for examining developmental physiology across a range of animal groups. Students will learn how to examine, stage and rear developing animals and will assess phenotypic responses to altered environmental conditions, perform ecotoxicological assays, and measure morphology and physiology. Students will conduct multi-week experiments, perform analyses, and convey experimental results in written and oral forms. Model organisms will typically include developing aquatic invertebrates, fishes, amphibians and chickens. *Field trip(s) during or outside of class may be required. Three hours of laboratory. Co/Prerequisite: BIOL 404.*

9. Why is this course being proposed?

This is a new physiology elective laboratory developed and taught by a new faculty member. The lab will provide an additional lab elective for Biology majors, particularly those that have declared a physiology concentration. The lab will be offered along with a lecture, which will be a pre or co-requisite. The lab provides a unique opportunity to train students in measuring physiological function in developing animals. Many labs will occur over multiple weeks so that students can appreciate how experimentation on developing animals adds an additional layer of complexity, but also how developing animals are useful for a number of physiological assays.

10. Mode of Instruction*
For definitions of the Course Classification Numbers:
http://www.csusm.edu/academic_programs/curriculumscheduling/catalogcurricula/DOCUMENTS/Curricular_Forms_Tab/Instructional%20Mode%20Conventions.pdf

Type of Instruction	Number of Credit Units	Instructional Mode (Course Classification Number)
Lecture		
Activity		
Lab	1	C16

11. Grading Method:*
☒ Normal (N) *(Allows Letter Grade +/-, and Credit/No Credit)*
☐ Normal Plus Report-in-Progress (NP) *(Allows Letter Grade +/-, Credit/No Credit, and Report-in-Progress)*
☐ Credit/No Credit Only (C)
☐ Credit/No Credit or Report-in-Progress Only (CP)

12. If the (NP) or (CP) grading system was selected, please explain the need for this grade option.

13. Course Requires Consent for Enrollment? ☐ Yes ☒ No

☐ Faculty ☐ Credential Analyst ☐ Dean ☐ Program/Department - Director/Chair

14. Course Can be Taken for Credit More than Once? ☐ Yes ☒ No
If yes, how many times? (including first offering)

* If Originator is uncertain of this entry, please consult with Program/Department Director/Chair.

15. Is Course Crosslisted: ☐ Yes ☒ No

If yes, indicate which course and check "yes" in item #22 below.

16. Prerequisite(s): ☒ Yes ☐ No BIOL 210, BIOL 211, BIOL 215, BIOL 353

17. Corequisite(s): ☒ Yes ☐ No BIOL 404 (BIOL 404 can be co or pre)

18. Documentation attached:
☒ Syllabus ☐ Detailed Course Outline

19. If this course has been offered as a topic, please enter topic abbreviation, number, and suffix:* BIOL 487-1 Dev Physiol Lab

20. How often will this course be offered once established?* Approximately every other year

PROGRAM DIRECTOR/CHAIR - COLLEGE CURRICULUM COMMITTEE SECTION:
(Mandatory information – all items in this section must be completed.)

21. Does this course fulfill a requirement for any major (i.e., core course or elective for a major, majors in other departments, minors in other departments)? ☒ Yes ☐ No

If yes, please specify:
Biology students may use this lab towards their requirement to have at least one upper division lab course in their major.

22. Does this course impact other discipline(s)? ***(If there is any uncertainty as to whether a particular discipline is affected, check "yes" and obtain signature.)*** ☐ Yes ☒ No

If yes, obtain signature(s). Any objections should be stated in writing and attached to this form.

Discipline _____ Signature _____ Date _____ Support _____ Oppose

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SIGNATURES : (COLLEGE LEVEL) :

Casey Mueller 12/09/16
1. Originator (please print or type name) Date

12/9/16
2. Program Director/Chair Date

2/7/17
3. College Curriculum Committee Date

2/8/17
4. College Dean (or Designee) Date

(UNIVERSITY LEVEL)

5. UCC Committee Chair Date

6. Vice President for Academic Affairs (or Designee) Date

7. President (or Designee) Date

Office of Academic Programs Banner: _____ Catalog _____ Revised 3/28/2007

* If Originator is uncertain of this entry, please consult with Program/Department Director/Chair.

Department of Biological Sciences
California State University, San Marcos

Biology 404L: Developmental Physiology Laboratory
Example Syllabus

Class Location & Time:

Instructor Information: Dr. Casey Mueller
Office: SCI 1 Room 210A
Telephone: 760 750 8508
Email: cmueller@csusm.edu

Office Hours:

Course Description:
This course will serve as a complementary laboratory course to Developmental Physiology (BIOL 404). The course will provide hands on experience with experimental techniques for examining developmental physiology across a range of animal taxa. Students will learn how to examine, handle and stage developing animals and will undertake measurements of physiological functions, including respiration and cardiovascular function, will assess phenotypic responses to altered environmental conditions and will perform ecotoxicological assays. Students will conduct multi-week experiments, perform analyses, and convey experimental results in written and oral forms.

Course Learning Objectives:
Students who successfully complete this course should:

1. Be able to understand basic physiological principles observed in developing animals.
2. Understand the processes of identifying different developmental stages and how that is linked to physiology.
3. Collect, evaluate, and present data using quantitative skills.
4. Be able to articulate their knowledge of animal physiology to others in both oral and written formats.

Objectives 1, 2 and 3 will be met during hands-on laboratory sessions; objectives 3 and 4 will be met through writing assignments, oral presentations and informal group discussions during lab.

Pre/Corequisites:
Co/Prerequisite: BIOL 404 Developmental Physiology.

Animal use and lab safety:
During this lab we will perform experiments on developing animals. All federal guidelines concerning the care and use of animals will be upheld and all protocols will follow those approved by the CSUSM IACUC.

For your protection, CSUSM has established safety procedures for all labs. This syllabus includes a copy of the CSUSM safety training handout. You cannot participate in a lab course unless you read this handout and sign a form stating that you read this handout. At this point we want to stress the safety precautions concerning lab attire. Every student is required to have a pair of safety glasses available to them, and students must abide by the dress requirements—note that **closed-toed shoes must be worn at all times**. If you show up for lab in inappropriate attire, you will not be allowed to participate and this will count as an absence.

Course Components:

Lab Reports:

As with any scientific endeavor, the ultimate goal of physiological research is to publish. For that reason, each lab report will be written in the style of a full peer-reviewed scientific paper. A guide on the content, format and grading of lab reports will be provided on Cougar Courses. The optional textbook titled "A student handbook for writing in biology" by Karin Knisely (2009, 3rd edition) and information found on a recommended website:

http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWtoc.html

are additional guides with examples. However, *any instructions or guidelines provided verbally or in writing by your instructor takes precedence over this supplementary information.*

Because background research is essential to understand and conduct scientific experiments, you will be required to cite **at least four peer-reviewed references** from the primary literature (i.e. journals) for each full paper. You may also cite the lab manual, and reputable scientific magazines (e.g. Scientific American, American Scientist, Discover), but remember that these are *not* peer-reviewed primary literature. **You may not cite websites**. Lab reports will be submitted through Turnitin on Cougar Courses.

Presentation:

Each student will present a 15 min talk on a paper of their choosing in the field of developmental physiology. Students should check with Dr. Mueller that their chosen paper is appropriate. Part of the points for the presentation will be earned from students participating in the class and asking questions of other students about their presentation and the paper they present. A grading outline for the presentation will be posted on Cougar Courses.

Lab notebook:

You are required to have a bound notebook for the lab (can be purchased from bookstore). This will be necessary to record important information during lab exercises (background information, measurements, and any interpretations you have about your data that will help with your reports). Your notebook will also be collected at the end of semester and graded. If you lose your notebook you will receive a zero for the lab notebook grade.

Participation:

Students are expected to be actively engaged in all lab activities and will be graded on such across the semester. Participation will also include animal care for those experiments that are performed over multiple weeks.

University writing requirement:

This course will meet the university writing requirement for a 1 unit course through the lab reports.

Assessment:

The course will be graded based on 500 points, as follows:

	Points	**%**
Developmental staging worksheet	30	6
Chicken embryo metabolism and angiogenesis report	80	16
Salinity and brine shrimp report	80	16
Temperature and tadpole heart rate report	80	16
Zebrafish ecotoxicology report	80	16
Presentation	80	16
Lab Notebook	40	8
Participation	30	6
Total	**500**	**100**

- Grades will be assigned approximately as a percentage of total points with:

≥92%	A	72-77.9%	C
90-91.9%	A-	70-71.9%	C-
88-89.9%	B+	68-69.9%	D+
82-87.9%	B	62-67.9%	D
80-81.9%	B-	60-61.9%	D-
78-79.9%	C+	<60%	F

If you choose to Withdraw from this course during the semester, it is your responsibility to initiate a withdrawal with the proper college office (Cougar Central). Failure to do so will result in you receiving an "F" or "FW" in this course.

Cougar Courses:
This course is an in person course, but you will access many course materials on the class Cougar Courses web site (http://cc.csusm.edu). Cougar Courses will be used to support student-instructor communication and provide access to lab instructions, class data files and support materials. If you are unfamiliar with using Cougar Courses please contact the student help desk at IITS (760 750 6505).

Class Policies:

Laboratory preparation: The handout/details for each week's laboratory will be posted in advance on Cougar Courses. It is essential that you be prepared prior to arriving in the lab. You must print out the lab and read the lab details and instructions for that week's experiment before coming to class.

Excused absences: Laboratory attendance is mandatory and it is unacceptable to leave class before the lab has finished. Students who know ahead of time that they will miss class for a legitimate and compelling reason (this will be determined by Dr. Mueller on a case by case basis) will be granted an excused absence if they notify Dr. Mueller in advance. An excused absence from class will not excuse the student from completing the laboratory assignment for that week.

Late turn-in of assessments: Students are expected to submit their laboratory reports on or before the deadline. Late assignments will receive at 10% deduction per day for the first 5 days, after which a grade of 0 will be received.

Academic dishonesty: Cheating will not be tolerated in any form. You will often work closely with your peers in class. However, any work you submit for grading must represent your own thinking, and must be in your own words. Any cheating or plagiarism that is detected will be reported to the Dean of Students. You are expected to know what plagiarism is – refer to

https://microsites.csusm.edu/plagiarism-tutorial/

for a tutorial on plagiarism (including "unintentional" plagiarism) and how to avoid them. The instructor reserves the right to apply appropriate penalties for cases of academic dishonesty detected, up to and including assigning an F for the class.

Disabled Student Services: Students with disabilities who require academic accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 4300, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909.

Tentative Laboratory Schedule:

Week	Date	Laboratory Activity	Assignment Schedule
1	Aug 29	Introductory lab (safety, overview, expectations)	
2	Sep 5	Brine shrimp development and salinity set up	
3	Sep 12	Staging developing animals	*Worksheet*
4	Sep 19	Chicken embryo respiration & angiogenesis	
5	Sep 26	Chicken embryo respiration & angiogenesis	
6	Oct 3	Chicken embryo respiration & angiogenesis	
7	Oct 10	Tadpole heart rate and temperature	
8	Oct 17	Brine shrimp development and salinity	*Chicken paper*
9	Oct 24	Brine shrimp development and salinity	
10	Oct 31	Tadpole heart rate and temperature	*Brine shrimp paper*
11	Nov 7	Zebrafish embryo alcohol toxicity	*Tadpole paper*
12	Nov 14	Presentations	
13	Nov 21	Presentations	
14	Nov 28	Zebrafish embryo alcohol toxicity	
15	Dec 5	**No lab**	*Zebrafish paper + lab notebook*

Safety Training

Chemical Safety & Hazard Communication

Welcome to Cal State San Marcos (CSUSM). As an Investigator or an employee, it is your right to know about potentially hazardous substances in the lab and the impact they can have on you. As your Safety Coordinators, it is our goal to do everything we can to protect your health and safety, and to minimize the risk of exposing you to any hazards. This CSUSM safety training handout includes information regarding the potential hazards associated with substances in your lab area and trains you to work safely with those substances. It addresses hazardous material safety and **Right-To-Know** Training. It also describes how you can protect yourself from unnecessary exposure, and what you should do in the event of an accident or spill. It is important that you adhere to CSUSM's safety guidelines.

CSUSM's Risk Management & Safety Service (RM&S) prepared this manual. RM&S is available to answer any questions you might have regarding hazardous materials in the labs (tel. 750-4502: Humberto Garcia).

SUMMARY of CALIFORNIA CODE of REGULATIONS

Title 8, CCR Section 5191, **Occupational Exposures to Hazardous Chemicals in laboratories and** 5194 **Hazard Communication**, are the California regulations that covers your **Right-to-Know** and information about hazardous substances. Copies of this regulation and its list of hazardous substances are on file in Risk Management and l Safety Service, located at 570 Rancheros Blvd., Suite 240. In the interest of safety, RM&S has:

- Prepared this written **Hazard Communication** training material for Investigator and student use.
- Developed a Chemical Hygiene Plan, that is available for review in the RM&S office.
- Developed a complete list of potentially hazardous substances in each laboratory and maintains **Material Safety Data Sheets** (MSDS) on each substance. Copies of MSDS's are on file in the Sciences stockroom(s) and are available to the students for those materials used in each laboratory.
- Ensured that all chemical containers are properly **labeled**. This includes both original and secondary containers.
- Trained personnel in **chemical handling** and measures that can be taken to protect themselves and others in the event of a spill or other emergency involving potentially hazardous substances.
- Developed material for informing students and CSUSM employees in **proper and safe handling** of potentially hazardous chemicals.
- Developed a requirement for outside contractors with hazardous chemicals to address employee **Right-to-Know** training and dissemination of information.

It is important that you know that you cannot be penalized for pointing out to your instructors any potential hazards.

HAZARDOUS CHEMICALS

Several potentially hazardous chemicals may be in use at CSUSM. These chemicals can be classified as presenting physical hazards, health hazards, or any combination of these.

PHYSICAL HAZARDS

A physical hazard produces an effect outside the body, and includes substances that are: Compressed Gases (such as nitrogen & oxygen); Explosives (e.g., hydrazines); Flammables (combustible solvents, e.g. diethyl ether); Unstable or Reactives (e.g. peroxides & picric acid), and Water Reactives (e.g. phosphorus pentoxide).

HEALTH HAZARDS

To present a health hazard, a substance must contact or enter the body. This entry can occur through breathing, ingesting, or by absorbing the substance through the skin. Categories of health hazards include:

Carcinogens (and Possible Carcinogens) – cancer causing substances (e.g. benzene);
Corrosives – acids and bases;
Irritants – substances, which abrade or irritate the skin surface or mucus membranes (e.g. ammonia);
Reproductive Toxins (mutagens and teratogens) – substances which affect your reproductive system or which may affect your offspring;
Sensitizers- substances, which have increased effect with chronic exposure over time rather than with short-term exposure (e.g. allergens);
Toxins (poisons) – substances that may cause illness, severe irritation, and/or death.

The effects of hazardous substances may result from either **acute** (immediate e.g. acid burn) or **chronic** (manifest themselves after extended use such as asbestos) exposure. They may also be **local** in nature (such as acid burn) or **systemic** (may be carried to other parts of the body where an effect is noticed e.g. sodium cyanide).

The danger a substance presents is affected by a number of different parameters. These include the physical state of the substance that is whether it is in a solid, liquid, or gaseous state. In general, gases are more hazardous than liquids, which are more hazardous than solids. Gases can most easily gain entry into your body by inhalation. Some gases may be readily detected because they have distinctive odors, but many exist which are odorless. Most liquids are not hazardous until they vaporize (become gaseous) or are absorbed through the skin. Solids are the most easily collected and maintained hazardous chemicals and therefore, the least hazardous. Their primary route of entry into the body is through the inhalation of particulates.

The degree of toxicity, or adverse reaction, someone may experience as a result of exposure to a substance is also affected by a number of different parameters. These include how the substance gets into the body (breathing, swallowing, etc.), the physical condition of the person, the amount and duration of the exposure, the sensitivity of the person to the substance, stress level, the substance's combined effect with other chemicals with which the person works, sex, race, and environmental conditions.

The primary way of informing you that you are dealing with a potentially hazardous substance is by ensuring that the substance is properly labeled. The label on a container will alert you as to the contents and type of hazard (e.g. acid, base, explosive). It will also include the name and address of the chemical manufacturer. If you remove any substance from the manufacturer's supplied container and place it in a secondary container, it is your responsibility to label that container with your name, the date, the contents, and any hazard or special handling instructions. Labels are never to be defaced or removed from containers unless the substance has been properly and legally discarded and the container has been properly cleaned.

Manufacturers use many different kinds of labeling procedures, all of which should provide the required information. A commonly accepted system is the Hazardous Material Information System (HMIS), which is used by the National Fire Protection Association (NFPA). NFPA labels identify the chemical (with common or chemical name). They are diamond shaped with red, blue, yellow, and white sections. The red, blue, and yellow sections contain numerical code (scale 0 to 4, 4 being most severe) which indicate the degree of hazard of each type: RED = **flammability**, **BLUE = health hazard**, YELLOW = **reactivity**. The **WHITE** area may contain a special hazard warning such as "**OX**" (oxidizer). Check the label on each chemical you use. The information supplied on it, along with that in the Material Safety Data Sheet, will tell you what precautions to use when handling that chemical. If the label is missing or defaced, do not use the chemical and report the unlabeled container to your instructor.

MATERIAL SAFETY DATA SHEETS

Every manufacturer of chemicals is required to provide a Material Safety Data Sheet (MSDS) for each chemical they produce. Users of chemicals should have available an MSDS for each chemical they use. Each stockroom will have MSDS's for every chemical available. Before working with any chemical, you should always check the label and read the MSDS. Ask your instructor where these MSDS's are located (generally in the following areas: Science stockrooms and in the Rancheros Bldg). MSDS's outlines special hazards, and recommend safe handling procedures. The MSDS also prescribes any personal protection that should be worn when handling or using the chemical.

PROTECTING YOURSELF FROM EXPOSURE

The first step in protecting yourself from potential problems with chemicals is to make sure you know how to use the chemical properly. Read the label, the MSDS, and follow the instructions they give you for using the chemical. CSUSM provides special equipment to help insure safe usage of chemicals. However, you are responsible for providing the most important safety equipment: **AN AWARE ATTITUDE** and safe clothing (described below).

Special equipment provided by CSUSM includes but is not limited to: **cabinets for storage** of flammables, acids, bases, combustibles and radioisotopes; **specially designated areas** for spill containment; **eyewash and emergency shower stations** equipped with spill-kits; **warning signs**; and **fume hoods**.

USE of PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment can help limit the exposure you have to chemicals. CSUSM requires laboratory personnel to wear safety goggles if conducting research involving <u>any</u> potential eye hazards when in the science labs. Lab glasses and disposable gloves will be provided for each relevant lab, depending on the day's activities. Eye protection must always be worn when working in areas where chemicals can splash into the eye. In addition, Investigators in laboratories are required to dress appropriately. Researchers wearing shorts, short skirts, open-toed shoes or sandals will not be permitted to work in the lab. Investigators are not allowed to eat, drink, chew tobacco, or apply cosmetics inside University laboratories. Adherence to CSUSM Risk Management and Safety guidelines as described herein will go a long way towards reducing **YOUR EXPOSURE**.

DEALING WITH EMERGENCIES

In the event of a spill: DO NOT TRY TO CLEAN UP THE SPILL YOURSELF! Alert your instructor. Evacuate the area **WHEN NECESSARY**.