

BMD 336.101 Physiology Laboratory - W
Spring Semester, 2008
UCOM 6011, Mondays 13:25 – 16:25

Instructor: Dr. Robin J. Mockett
Office: UCOM 6000, Room 6121 (Research Lab Room 6128)
Telephone: 251-380-2676 (Office), 380-2677 (Lab), 380-2710 (Department)
E-mail: mockett@usouthal.edu

Office Hours: Tuesdays and Wednesdays, 13:00 – 16:00, or by appointment

Prerequisites: EH 102, BMD 334, BMD 335 (BMD 335 may be taken concurrently)

Text/Manual: The *recommended* textbook for BMD 336 is Principles of Human Physiology, Third Edition, by C. L. Stanfield and W. J. Germann.

The *required* laboratory manual, PhysioEx 7.0, is available electronically (see Appendix 1 of this syllabus).

The *required* iWorx Physiology Laboratory Manual will be provided on a compact disk (see Appendix 2), and additional printed materials will be provided by the instructor.

Course Description: The goals and objectives of this course are (i) to demonstrate a selection of physiological principles and concepts presented in the lecture courses (BMD 334 and BMD 335), (ii) to present additional concepts that serve to expand the student's knowledge of physiology, (iii) to provide training and practical experience with basic physiological laboratory equipment, and (iv) to provide instruction and practice in scientific writing. A detailed schedule is provided at the end of this syllabus.

Course Policies and Procedures: (1) The course structure consists of one session or activity each week, in one of two formats: (i) PhysioEx – computer simulations performed by students individually outside of class, or (ii) iWorx/Instructor handout – class sessions in UCOM 6011 consisting of a pre-laboratory lecture and hands-on exercises. Students will work in pairs in the lab, and in groups of 2-4 for two sessions involving frogs. Students should read the iWorx and/or handout material before arriving in class.

(2) Computers and software provided for laboratory exercises are to be used only for the completion of the assigned exercises. The software should not be modified, sold or distributed to any user without permission of the instructor.

(3) No food or drink is allowed in the laboratory at any time – including chewing gum.

(4) Attire – laboratory jackets must be worn at all times in UCOM 6011 (they are available in the laboratory, or you may purchase your own at the campus bookstore). Gloves must be worn for experiments involving frogs; sturdy, covered shoes are strongly recommended for these lab sessions (no sandals or “flip flops”).

(5) Clean-up procedures include returning all components to iWorx kits each week, turning off and disconnecting the IWX data acquisition unit and computer. Used gloves and ECG electrodes are treated as biological waste, and must be placed in the red biohazardous waste containers. Frog carcasses and tissues will be collected in separate biowaste bags by the instructor.

Grading: Grades are based on a total of 200 points, subdivided as follows:

Laboratory reports – iWorx/Inst. (7)#	70 points (10 points each)
Laboratory reports – PhysioEx (5)	50 points (10 points each)
Scientific paper – draft version	25 points
Scientific paper – final version	25 points
Laboratory professionalism	30 points
Open laboratory	** points (see below)

#No report is required for the tutorial in the first week.

Laboratory reports (iWorx and PhysioEx) will consist of completed, printed copies of the forms and questions in the laboratory manual, any graphs and tables requested in the manual, and a saved copy of the raw data from iWorx exercises for verification. The data should be saved in the desktop folder BMD 336.101 at the end of each experiment. The saved data may be copied onto a USB drive (recommended) or a compact disk, or sent to your home computer as an e-mail attachment if the data analysis cannot be completed in class.

Regardless of the method used, it is the student's responsibility to ensure that the data are not lost. Printed reports are due one week after completion of the class session or date indicated on the class schedule, or on the next work day in the case of holidays.

Scientific paper – both the draft and final version should consist of a title page, abstract, introduction, materials and methods, results (text, tables and figures with legends), discussion and references. The final version should be a modified version of the draft version, incorporating changes and/or additional information recommended by the instructor. The draft version, containing the instructor's comments, must be returned with the final version. Both versions will be graded for content and style, as described in Appendix 3 of this syllabus.

Penalties for late work – 10% of the available points for a laboratory report or scientific paper (draft or final version) will be deducted for the first day that it is past due, and 20% for each additional day, not counting week-ends or holidays.

Laboratory professionalism refers to adherence to the course policies noted above, and to generally respectful treatment of experimental animals, other students, staff and faculty.

Open laboratory – the final regularly scheduled class session (April 21) will be used for the completion of any exercises missed due to official absences, or for completion of an alternative make-up assignment at the discretion of the instructor. A combination of optional quiz questions and/or laboratory exercises will be made available for bonus points (up to a maximum of 10-15 for the entire course) to students who wish to improve their grades. A survey of student opinion will be conducted by departmental staff during this session, in the absence of the instructor, and results will be provided anonymously to faculty only after the course final grades are submitted.

Graded work will be returned to the student during in-class sessions or office hours. Grades will not be posted in public or provided via electronic mail or telephone.

The percentage grade will be converted to a letter grade, according to the following standard: A = 90-100%, B = 80-89.9%, C = 70-79.9%, D = 60-69.9%, F = 0-59.9%.

Attendance: Attendance is required at all class sessions, and punctuality is encouraged in order to have time for the experiments. An official absence for reasons recognized by the university must be documented in writing; in the case of illness, a written statement must be provided by a physician. Work missed due to an official absence must be completed during the open laboratory session on April 21, or a grade of 0 will be assigned. Unofficial absences will result in a score of 0 for the laboratory work performed that week, and the loss of 5 points for laboratory professionalism.

Plagiarism: Students are encouraged to use all available resources to learn about physiology, including the library, computer (internet research) and discussions with classmates. There are two caveats: (i) the instructor, text and manual are the only authoritative sources of information for BMD 336, and (ii) assignments completed outside the classroom should be written or typed in the student's own words and by his or her own hands. All material from any source must be cited. Copying detected by the instructor, using Turnitin plagiarism software* (see www.turnitin.com for more information) or other means, will result in a grade of 0 for that assignment. Copying followed by modification of another author's wording is also unacceptable. Any instance of academic misconduct will necessitate official action, as described in the Student Academic Conduct Policy, available in The Lowdown, pp. 136-142, or at <http://www.southalabama.edu/academicaffairs/studentacadconduct.pdf>.

*Please note that BMD 336 students are not required to submit their own work to Turnitin, and that intellectual property rights are not necessarily well protected by such sites. If the site is used by the instructor, no personally identifying information about any student will be included in the submission.

Students with disabilities: If you have a specific disability that qualifies you for academic accommodations, please notify the instructor/professor and provide certification from Special Student Services. The Office of Special Student Services is located in Room 270 of the Student Center (460-7212).

Flexibility: Although every effort will be made to adhere to the policies and schedule outlined in this syllabus, the need to adapt to unforeseen circumstances is inherent to laboratory work. Changes in the schedule or modifications of certain exercises resulting from supply problems will be announced in class or via e-mail, if possible, but last-minute changes might be unavoidable in some circumstances.

Class Schedule

DATE (2008)	Type	Experiment	Topic
January 7	Inst/iWorx	Tutorial (T-1)	Introduction to course, writing, iWorx
January 14	PhysioEx	Exercise 1	Cell Transport Mechanisms and Permeability
January 21	-	-	HOLIDAY (Martin Luther King)
January 28	Instructor	Handout	Human sensory physiology
February 4	PhysioEx	Exercise 3	Neurophysiology and nerve impulses
February 11	iWorx	AM-1, AM-2	Frog gastrocnemius muscle
February 18	Instructor/ iWorx	Handout, HM-1, HM-2	Human reflexes, human muscle
February 25	iWorx	AM-3	Frog heart
March 3	Instructor/ iWorx	Handout, HH-1, 2, 4, 5	Human cardiovascular system
March 10	-	-	HOLIDAY (Spring Break)
March 17*	iWorx	HS-1, 2, 4	Human respiration
March 24	PhysioEx	Exercise 9	Renal system physiology
March 31**	PhysioEx	Exercise 10	Acid/base balance
April 7	iWorx	HH-3	Exercise physiology
April 14	PhysioEx	Exercise 4	Endocrine system physiology
April 21***	Instructor	?	Open Laboratory

*Scientific paper – topic assignment

**Scientific paper – draft version due date

***Scientific paper – final version due date

Appendix 1 – PhysioEx 7.0

In order to complete the required PhysioEx 7.0 exercises, go to www.physiologyplace.com (www.aw-bc.com/physiologyplace/), and follow these instructions:

1. Click PhysioEx 7.0.
2. Click PhysioEx 7.0 for Human Physiology, the upper middle text cover image on the screen.
3. Register, using the access code and instructions inside the front page of the recommended textbook, Principles of Human Physiology, Third Edition (Stanfield and Germann). If you have a used textbook, then you will need to click “Buy Access” at the registration site, or purchase a code at the university bookstore. This step is only necessary when you use PhysioEx for the first time.
4. Log in, using the name and password you selected during registration.
5. Click the window in the upper middle portion of the screen, entitled “Exercise 1: Cell Transport Mechanisms and Permeability”, scroll down, select the assigned exercise, and click “Go”.
6. Perform all steps indicated on the screen. Print, complete and hand in the PDF file for the lab instruction worksheet (NOT the review sheet), including all data from the simulations.

Appendix 2 – iWorx

1. Home installation of software: Each student should install the LabScribe2 v2.045 software on a computer at home, in order to print instructions and data. The installation CD is compatible with Windows (WIN 98 - Vista). If you have a Macintosh computer or any other problem with the installation, please see the instructor. Otherwise, please follow these instructions:
 - 1.1. Insert the LabScribe2 v2.045 CD and wait while Setup is loading.
 - 1.2. Click “Next” on the LabScribe2 2.0 setup window when it appears, then read the license agreement and click “I Agree” (unless you do not agree).
 - 1.3. Select all components for installation (check all boxes and click “Next”), so that your computer will install all components of the software in the destination folder C:\ Program Files\ iWorx\ LabScribe2\ .
2. Use of hardware in the laboratory: The standard equipment to be used in all iWorx sessions consists of a power bar, PC computer, computer mouse, IWX/214 data acquisition unit, USB cable and TR-12V DC-2.5-GND transformer. Additional equipment will be used in each session, and instructions to set up that equipment will be provided in the files for individual experiments. To set up the standard equipment:
 - 2.1. Plug the 90W-AC adapter into the benchtop outlet and into the back of the computer (battery power may not sustain the computer throughout a 3-hour experiment).
 - 2.2. Connect the USB cable to the USB port at the back of the IWX/214 and to the computer via the lower USB port at the back right side of the computer (if a different port is used, the hardware may not be recognized; always use the same USB port).
 - 2.3. Connect the Logitech “mouse” to the upper USB port at the back right side of the computer.
 - 2.4. Connect the TR-12V DC-2.5-GND transformer to the back of the IWX/214 (below the power switch) and plug it into the power bar.
 - 2.5. Turn on the power bar connected to the benchtop outlet.
 - 2.6. Turn on the computer and the IWX/214.
3. Use of software: Detailed instructions are provided in the files for individual experiments, and in the tutorial covered in the first class session. The tutorial file will also serve as a reference, so that abridged instructions can be followed during subsequent experiments. Please print and read the files for the assigned iWorx experiments before the beginning of each lab session – either the files contained on the installation CD or alternative files provided by the instructor. To use iWorx at home or in the laboratory:
 - 3.1. Click on the LabScribe shortcut on the computer’s desktop to open the program. If a shortcut is not available, click “Start” (lower left corner of computer screen), move the cursor

to “All Programs” and then to “iWorx”. Select “LabScribe” from the iWorx submenu. The LabScribe main window will appear on the screen.

- 3.2. On the main window, pull down the “Settings” menu and select “Load Group”. Select “Settings” again, then click on “IPLMV4Standard.iwxgrp” and click “Open”.
- 3.3. Pull down the “Settings” menu again, and select the appropriate files, e.g. “Tutorial” and then “Tutorial-LS2”. The main window will be configured for the selected experiment, and the PDF instruction file will appear in a separate window.
4. You will need to purchase a USB drive and bring it to each class session in order to save iWorx data for analysis on your computer at home.

Appendix 3 – Writing a Scientific Paper

In this course, each individual student will be assigned one laboratory experiment on which to write a paper in scientific format. Assignments will be given on March 17, and may include any experiment completed by that date. Please keep all data files (back-up copies are strongly recommended), in order to have results available when the assignments are given. The draft report will be due March 31. Final reports, incorporating the instructor's requested changes, will be due April 21. The draft version *must* be resubmitted with the final version (missing drafts will be converted to a grade of 0). It is recommended that an outline be prepared in the first week after the assignment is given, and that a draft of the paper be taken to the University Writing Center (see <http://www.southalabama.edu/writing/>) before it is submitted. The Writing Center is located at 207 Alpha Hall East (460-6480). The format of the paper is described below and must be followed.

A scientific paper is organized around the scientific method, in which known information is used to generate a hypothesis about something that is unknown. An experiment is planned with precise methodology to test the hypothesis. The results from the experiment are recorded and analyzed. Based on the results, the hypothesis is either accepted or rejected. Although there are some stylistic variations among scientific journals, each journal gives detailed guidelines for the format of reports. The scientific paper for BMD 336 should be broken down into the following sections, which are described below in order of appearance in the paper: Title page, Abstract, Introduction, Materials and Methods, Results, Discussion, Acknowledgments, References, Tables and Figures.

The following general guidelines apply to all sections: (i) text should be double-spaced and presented in Times New Roman (12 point) or Arial (11 point) font, (ii) all pages should be numbered, beginning with the title page, (iii) citations in the text (beginning with the Introduction and ending with the Discussion) should follow the format specified below for the Introduction, and (iv) specific actions or observations should be described in the past tense (“the frog was decapitated by the instructor”), but widely known information should be stated in the present tense (“frogs are used to study physiology in undergraduate laboratories”).

TITLE PAGE: The title page gives the title of the report, the author's name and contact information: university address, telephone and fax numbers, and e-mail address. For this report, telephone and fax numbers may be omitted and students may use the laboratory address (UCOM 6011, Department of Biomedical Sciences, University of South Alabama, 307 University Blvd. N., Mobile, AL 36688).

ABSTRACT: The Abstract is a short synopsis of the experiment, generally limited to a single paragraph with a specific number of words, but no graphs, tables or citations. For BMD 336, the limit is 250 words. The Abstract consists of brief statements of the purpose of the experiment, the methods used, the general results obtained and the main conclusion. A reader should be able to understand the Abstract without reading any other part of the report. The Abstract, although presented first, is generally written last.

INTRODUCTION: The Introduction provides the background information that led to the hypothesis, and enables the reader to understand *why* the experiment was performed. Previously published papers or books should be cited to explain the basis for the hypothesis.

Citations should include authors' names (first author *et al.* if there are more than two authors) and the year of publication. They should be placed in parentheses immediately after the information being cited, as shown in the following passage:

“Mountains were first described long ago (Smith, 1972). Additional characteristics of mountains were reported later (Smith and Wesson, 1990; Smith *et al.*, 1999). Mountains in specific areas have also been studied (Jones, 1986), but comparisons with hills were not performed until much later (Wesson *et al.*, 2007).”

The Introduction should be approximately 2 pages in length.

MATERIALS AND METHODS: The Materials and Methods section states the materials used, indicating their source (for BMD 336, that will include specific components of the iWorx kit), and describes the methods used in sufficient detail that the reader can replicate the experiment, keeping in mind that different laboratories have different equipment available. It is often divided into subsections, as is the Results text. The Materials and Methods section should be approximately 2-3 pages in length.

RESULTS: The Results section provides the critical findings of the experiments in the most suitable format: written text, tables or figures (graphs). *There is no explanation of the results in this section, just a presentation of the findings.* Tables and figures should be placed at the end of the paper on separate pages, but reference must be made to each table and figure in the Results text. Do not assume the reader will find tables and figures; point the reader to them. Statistical analyses of the results are also presented, if appropriate. The Results text should be 2-3 pages in length, not including tables and figures.

DISCUSSION: The Discussion provides the author's interpretation of the results. It may begin with a brief summary of the main results, and should explain whether the data support the original hypothesis. If the results contradict previous reports, then the author should explain why this contradiction exists. The author should cite other published work that supports his/her interpretation. The Discussion may also raise new hypotheses and suggest directions for further experimentation, but it should not extend too far beyond the results of the actual study that is being reported. The Discussion should be approximately 2-4 pages in length.

ACKNOWLEDGMENT: This section consists of a very brief statement of the source of funding for scientific research (not applicable for BMD 336, or you may state that the work was performed in partial fulfilment of the requirements of BMD 336), and thanking any individual who contributed to the work but is not listed as an author. In this course, your partner assisted in the collection of data, or served as the subject, and that should be acknowledged.

REFERENCES: This section consists of a list of all references cited in the paper. The references are to be listed in alphabetical order, based on the first author's surname (or numbers of authors or dates of publication, when several papers have the same first author). Your paper should cite your laboratory manual (and likely the textbook) and at least 3 original research articles. Examples of the format for references are listed below.

Reference from a journal article: Authors (Last name, initials). Title. *Journal* (universal abbreviations preferred, e.g. *Physiol. Rev.* for *Physiological Reviews*), **Volume number:** pages (year).

Reference from an article in a book: Authors (Last name, initials). Article Title. In: Editors, Book Title, City of Publication, Publisher: pages (year).

Reference of pages from a book: Authors (Last name, initials). Book Title, City of Publication, Publisher: pages (year).

Example:

iWorx. LabScribe Tutorial. In: iWorx Physiology Laboratory Manual, Dover NH, iWorx: T-1-3 – T-1-11 (2007).

Jones, D. Mountains of Alabama, Mobile, Local Press: 300-340 (1986).

Smith, J.J. Mountains. *Mountains and Hills*, **1**: 1-15 (1972).

Smith, J.J., and Wesson, R.R. Mountain tops. *Mountains and Hills*, **19**: 447-453 (1990).

Smith, J.J., Wesson, R.R., and Jones, D. Mountain tops are high. *Mountains and Hills*, **28**: 71-77 (1999).

Wesson, R.R., Jones, D., and Smith, J.J. Hill tops are not so high. In: Johnson, P.P., Jackson, A.B., Eds., *Hills versus Mountains*, New York, Riley Press: 25-29 (2007).

TABLES: Each table must be numbered in order of appearance. A brief title should be placed above the table, and any necessary explanatory material should be provided in footnotes below the table. The footnotes should not duplicate the description of results in the Results text. Headings should be placed in the first column and row. The use of gridlines is optional, but it should be clear which column and row contain each datum.

FIGURES: Each figure must be numbered in order of appearance (tables and figures are numbered separately). Each figure must be accompanied by a figure legend, which begins with a title and contains a few sentences explaining the results without repeating the Results text. Figure legends are usually listed on a separate page(s) between the References and Tables, but in BMD 336 you may choose to place a legend below each figure, if there is sufficient space. Graphs presented in figures must have axis or bar titles, and uniform numbering of the axis scale for continuous variables. Computer software should be used to plot the data accurately.

Appendix 4 – Use of Library Resources to Obtain Reference Material

1. Double click Internet Explorer on the desktop.
2. Type <http://www.ncbi.nlm.nih.gov/> and press Enter. You may wish to bookmark this page later on your home computer.
3. Click on the downward arrowhead beside All Databases (upper left) and select PubMed. PubMed is the primary source of information about research and review articles published in the biomedical sciences.
4. Search PubMed for physiology: click Go or press Enter. As you can see, many papers have been published on this topic: >7 000 000!
5. To narrow your search, replace physiology with frog muscle as the search term. Now there are fewer “hits” (papers containing frog, muscle or synonyms in the title, Abstract or key words), but still >13 000.
6. Further narrow the search by adding gastrocnemius to the search terms. Scrolling down, you will see the first 20 titles and references. Various display options may be adjusted at the bottom of the page.
7. You may also search PubMed by author name. Replace the search terms with Mockett and click Go. The number of items will be decreased by adding initials (Mockett RJ) or additional author names (Mockett Orr).
8. On the Mockett Orr search, click the blue, underlined author names for item 3. The screen now displays the Abstract of the paper, and the complete article is freely available - click the icon on the right, and then click Full Text (PDF) on the right in the new window. You may scroll through, read, save or print the article to see an example of the structure of a scientific paper. Your BMD 336 paper will be less technical.
9. Close the window and go back from the Abstract to the Mockett Orr publication list. Select item 9 (click the author names). Free full text access is not available, but you may gain access through the university’s online subscription. Note the journal title (*Free Radic. Biol. Med.* is the abbreviation for *Free Radical Biology & Medicine*), year of publication (2003), volume (34), issue (2) and page numbers (207-217).
10. Open a new window and type <http://southmed.usouthal.edu/library/index.html> . You will reach the home page of the Biomedical Library.
11. Under Resources, click Electronic Journals, then click the letter F. Journal titles beginning with that letter are listed alphabetically. Scroll to the bottom of the page, click the downward arrowhead, scroll down and jump to page Frederick News - Post, The --- French Historical Studies. Scroll down and click the checked box in the Full Text Access column beside *Free Radical Biology & Medicine*. Click the appropriate volume number at the left, select issue 2, then scroll to pages 207-217 (item 8) and click PDF (407 K). You now have access to the

article. If it were relevant to your assignment, then you could read it and cite information from the article (in your own words!) in your scientific paper.

12. Open a new window and locate the journal *Physiological Reviews* among the Biomedical Library's electronic journals. Note that online coverage does not extend any earlier than 1993. Suppose that you want to read an article published in 1988. Click SOUTHcat (upper left on this page, and also available on the Biomedical Library home page). Search for *Physiological Reviews* (Search by: Title), scroll down, and note that volumes from 1960 – 1992 are available on compact shelving at the Baugh Biomedical Library. You can obtain the bound journal from the library (see library staff for assistance) and make a photocopy. Earlier volumes (1921 – 1959) are in storage, but they may be obtained by library staff.
13. Close this window, return to the Mockett Orr list, and select item 2. In this case, the article is not freely available, and a search of the Biomedical Library's electronic journals will reveal that there is no subscription. Click SOUTHcat and search by title for *Biogerontology*. There are no hits. The university does not subscribe to this journal. In order to gain access to this article, you would need to make an interlibrary loan request (see the instructor if you believe this is essential for your BMD 336 paper), or contact the authors. Contact information is often provided with the PubMed Abstract, and many authors are pleased to send electronic copies of their papers to other scientists. Please do not request papers this way unless it is really necessary or you are seriously interested in that person's work.

Appendix 5 – Waiver for Voluntary Participation in BMD 336 Experiments

I, _____, understand that participation as a subject in all experiments in BMD 336 requiring human subjects is voluntary. I understand that even if I volunteer to be a subject, the experiment will be terminated at my request at any time. I understand that volunteering or not volunteering for these experiments will have no impact on my grade. Furthermore, I agree to follow the instructions of Dr. Mockett, terminating the experiment if necessary.

I additionally understand that the purpose of all observations and experiments in BMD 336 is instructional, not diagnostic. Accordingly, questions of personal health, including any which may arise from measurements made in BMD 336, should be addressed to a qualified medical professional.

I certify that I have no health problems or conditions that may be prohibitive for participation in these experiments. Such problems or conditions include, but are not limited to, heart disease, hypertension, endocrine disorders, anemia, asthma, or pregnancy.

Signature

Date