BIOL 3430-PHYSIOLOGY

LECTURE SECTION
BIOL-3430.001
Tues. and Thurs., 12:30-1:45 PM
Science & Technology (CI)-113

LABORATORY SECTIONS
BIOL-3430.101 Thurs, 09:00 -11:50 AM
BIOL-3430.102 Fri., 12:00 -02:50 PM
BIOL-3430.103 Fri., 08:00 - 10:50 PM
BIOL-3430.104 Wed., 02:00 -04:50 PM
Science & Technology (ST)-301

INSTRUCTOR: Dr. Andreas Fahlman (Ph.D.)
Office: Harte Research Institute (HRI)-118
Office Phone: (361) 825-3489
E-mail: andreas.fahlman@tamucc.edu
Office Hours: Wednesday: 8:00-11:00, Tuesday and Thursday 9:00-10:00 AM;

Students may make appointments to see me or at times other than those listed above. If I am unavailable or need to relocate during office hours, I will post a note on the door. I will only correspond by e-mail with students who use their official “islander” e-mail addresses.

COURSE DESCRIPTION: Physiology is the study of an organism’s vital functions. The course introduces students to the functioning of different tissues, organs and other anatomic structures. Students will study the processes that are a product of the interactions of complex tissues, organs and organ systems, each of which are regulated by complex patterns of genetic regulation in individual cells. This course will give students an understanding of the physical and chemical laws that apply to all physiological processes, the importance of homeostasis, the role of phenotype in physiological processes, environmental influences on physiological processes, and the evolutionary changes that produce genotypes. In addition, the students will get first hand experience how to execute, analyze and present a research project.

STUDENT LEARNING OUTCOMES: The objective of this course is to provide students with a basic understanding of physiological processes that govern life. Students will learn and use the vocabulary of physiology, and to illustrate, explain, discuss, and critique the functions of physiological systems such as respiration, metabolism, thermoregulation, osmoregulation, and life in extreme environments. Students will learn the integrative nature of physiology by studying the interaction of the various animal body systems that produce homeostasis. For the laboratory section of the course, the students will get experience in the scientific process. They will learn how to formulate a hypothesis, plan and execute an experiments, analyze and present the data both orally and in written format according to standards used by typical scientific, peer-reviewed journal articles.

Students should attend and participate in lectures and laboratories, read the assigned material, and mentally organize information from their instructors, their readings and their laboratory work. For all components that are examined within each topic in the schedule, the student will be expected to…

- Understand and correctly use scientific terminology.
- Describe the physical and chemical laws that govern life.
- Analyze selected physiological processes and explain their importance for living organisms.
- Use the scientific process to carry out an independent research project

PREREQUISITES: Biology 1407 is required.
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COREQUISITES: Students enrolled in BIOL 3430 lecture MUST ALSO be registered in the laboratory portion of the course. The professor or the TA will give a safety lecture during the first lab meeting. A safety sign-in sheet (sorted by lab section) will be provided for the student to sign and this is the proof that they have attended the safety lecture. If a student is unable to attend the safety lecture given during the first lab, or they attend and forget to sign the sheet, they MUST take the online safety quiz (Laboratory Safety Seminar, SMTE 0091) instead and bring a hard copy of the results to the TA during the next lab period. ALL students are required to fill out and sign the safety rules and regulations handout in lab. This handout contains students' emergency contact info, any medical conditions, where safety equipment is located in lab, etc. Students who fail to comply with the safety rules will not be admitted to the lab by the week of September 3.

REQUIRED TEXT: There are no required texts for this course and all the material will be given in class. However, it is HIGHLY recommended that you acquire the following book from which a lot of the information and reading will be from. Environmental Physiology of Animals, 2nd edition, Willmer, Stone and Johnston, Blackwell Publishing ISBN: 978-1-4051-0724-2.

REQUIRED LABORATORY MANUAL: There is no required laboratory manual but it is recommended that you either purchase or look at the following book for the laboratory portion of this course. Doing Science, 1st Ed. by Ivan Valiela, Oxford University Press, 2001.

REQUIRED ITEMS: Each student is required to have a stick/flash/thumb drive, and one notebook for lab. All students will need lab coats and must comply with all dress code regulations which includes wearing: long pants, closed toed and closed heel shoes, and putting up/back long hair.

REQUIRED E-MAIL: All students must have a Texas A&M University-Corpus Christi e-mail account (“islander” account; the address usually follows the format: flast@islander.tamucc.edu). Make sure that you can access and use it because, for students in my classes, it is the only e-mail address to which I will reply. If you have not done so, please go to http://www.tamucc.edu/ise.html to obtain a new islander account.

TENTATIVE LECTURE SCHEDULE:

<table>
<thead>
<tr>
<th>Section (dates)</th>
<th>Content</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Aug 23)</td>
<td>Introduction to course and lab</td>
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<tr>
<td>2 (Aug 28, 30)</td>
<td>Fundamentals of Physiology</td>
<td>1-5, 10.1-10.5</td>
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<tr>
<td>3 (Sept 4, 6, 11, 13)</td>
<td>Metabolism</td>
<td>3, 6</td>
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<tr>
<td>4 (Sept 18, 20, 25)</td>
<td>Respiration</td>
<td>7, 11.4, 12.4, 13.4, 15.4</td>
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<td><strong>Sept 27</strong></td>
<td><strong>Test 1</strong></td>
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<tr>
<td>5 (Oct 2, 4, 9, 11)</td>
<td>Circulation</td>
<td>7.4</td>
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<tr>
<td>6 (Oct 23, 25, 30, Nov 1)</td>
<td>Central nervous system</td>
<td>9.1, 9.3</td>
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<td><strong>Nov 6</strong></td>
<td><strong>Test 2</strong></td>
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<tr>
<td>7 (Nov 8, 13)</td>
<td>Muscle</td>
<td>9.2</td>
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<tr>
<td>8 (Nov 20, 27)</td>
<td>Thermoregulation and extreme environ</td>
<td>8, 16</td>
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Nov 29  Test 3
9 (Dec 4)  Review (optional)
Final  Dec 11, 2011

LAB DEADLINES:
9/26 (Wed lab), 9/27 (Thurs lab), 9/28 (Fri Lab): Material and methods section and final project hypothesis due
11/28 (Wed lab), 11/29 (Thurs lab), 11/30 (Fri lab): Project presentations and project papers due

FINAL GRADING: Your final letter grade will be based on the points you earn in lecture and laboratory. The final grading scale will also be determined at the end of the semester, but the cut-off for each grade will be no higher than the following:

\[ A \geq 90\% > B \geq 80\% > C \geq 70\% > D \geq 60\% > F \]

Final course grades will be determined by the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Lecture Examination (average of best 2 out of 3 exams)</td>
<td>40%</td>
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<tr>
<td>Research project paper (Laboratory)</td>
<td>15%</td>
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<tr>
<td>Research project presentation (Laboratory)</td>
<td>15%</td>
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<tr>
<td>Final examination</td>
<td>30%</td>
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**EXAMINATIONS** The exam schedule is as follows: **Exam 1**, 9/27, **Exam 2**, 11/6, **Exam 3**, 11/29, and **Final Exam**, 12/11, 11:00 am – 1:30 pm. Any student who knows in advance that they will miss an exam due to official University business may notify Dr. Fahlman at least fourteen (14) days in advance to make arrangements to take the exam early. The date and time for the final exam are **non-negotiable** for any reason, unless a student have conflicting examinations on the same day that cannot be re-scheduled. The final exam will be comprehensive. The format for all exams may vary and may include multiple choice, short answer, essay, matching and definitions.

**BONUS POINTS:** Individual extra credit assignments will be available in this class. This will be a combination of an assignment (critical review of a scientific paper) and class quizzes. The assignment will be announced only once, so be in class, be on time and stay for the entire period. Quizzes may be given unannounced before each lecture and these will be similar to questions on the test. Bonus points (from quizzes, and assignment) cannot be made up—period. **Extra credit assignment: 2.5%, student may earn extra credits by completing an assignment given in class.** The assignment requires a critical analysis of a published paper given by the Professor and a short written statement (1/2 page) that critically view the prons and cons of the paper and its conclusions. You may work in teams to solve the problem and the material covered in class should give you the physiological knowledge to solve the problem. Snoyhr 2.5% may be earned from the quizzes given in class.

**LABORATORY (30% of final grade):** Students will also be required to complete a 10- to 15-page (double spaced, no font larger than 12 pt., margins no greater than 1 inch top/bottom/left/right) group paper based on a group research project completed in lab. **Groups will consist of no more than three (4) people.** Each student will participate in writing the paper and must be based on primary data collected in the lab. The research project will be explained by the TAs and will be based on a simple well-defined hypothesis (stated by
each group) and should follow the scientific method. Students who have not had statistics will want to do background research on appropriate sample size and on appropriate statistical analyses for the data gathered. Valiela (2001) should be consulted and used to complete this portion of the course successfully. It will be assumed that ALL students have taken the opportunity to read the Valiela book when considering experiments, and in preparation of the paper and presentation possible problems with the design should be presented. In addition to the paper itself, a 10 to 15 minute oral synopsis of the group research project will be presented in lab. All members of the group are required to participate in the oral presentation. Students are required to use a Power Point slide show for the oral presentation. All student groups are required to obtain approval of research projects from Dr. Fahlman AND the lab TA. It is also strongly recommended that each group discuss their projects and papers with Dr. Fahlman and/or the TA throughout the semester. All students are required to keep a lab notebook that includes information about all experiments. This will prevent having to ask questions about lab procedures later in the semester when groups are running their own experiments. It is each student’s responsibility to know how to hook up and run all equipment and experiments. It is not the TA’s responsibility to answer questions about procedures previously done in labs. Each member of each group is to be familiar with all procedures and methods. Sample evaluation sheets for the laboratory presentation (with individual point values for specific items) are included at the end of this syllabus.

LABORATORY SAFETY: Students must wear a laboratory coat to be admitted to lab. No spare coats are available so if you forget yours, you will not be admitted to lab. Long pants are required. Shoes have to be completely closed around the toes, heels, top and bottom of the feet. No food, drink, makeup, grooming materials, gum, breath mints/spray/fresheners, candy, or anything else that goes in the mouth will be allowed. Gloves will be provided as needed.

ATTENDANCE: My attendance policy is the same as that stated in the University Catalog. Attendance is the student’s responsibility, and students are expected to attend, be on time for and remain the entire period in every class. Late arrival will not be accepted and I have a closed door policy during class. Attendance is not used to determine grades. In lecture, even when I take roll, I do not give—per se—a bonus for attendance (except for quizzes that you may miss if you do not attend), nor a penalty for absence (except for missing an examination, or an assignment). I may choose to give information not covered in the book or clues about the extra credit assignment during any given class. Thus, coming to lecture on a regular basis should result in a higher grade, and if you come to class often, it will help you do well in this course. Attendance is mandatory in the laboratory portion.

ABSENCES: You are responsible for the material covered and assignments made in every lecture regardless of whether you attend it or not. “I came in late and didn’t hear about the assignment, or specific material,” is never an acceptable excuse. It is always your responsibility to determine what happened in class during your absence. If you are absent, tardy, or leave early, you will have to copy a classmates notes and handouts. I will not, “track down” absentees to make sure that they know about material not covered in the textbook. As note-taking is an important skill to develop, I do not “share” my notes or PowerPoints (including posting them on the web).

The grading formula above allows you to “drop” one lecture examination (not including the final examination). Therefore, if you miss a regular lecture examination (for any unacceptable excuse, see below), then that one is your lowest score and counts as your “drop”.

Labs are three hours long and students are expected to be in lab for all three hours each lab period. There is always work that can be done while in lab. Students who are diligent during regularly scheduled labs will have an advantage over those who are not.
Miscellaneous Policies Regarding Attendance:
There are no make-ups for missed work except for an excused absence. An excused absence allows us to make alternative arrangements for completing work and taking exams. The documentation required for an absence to be excused must be:

• from an appropriate source (e.g., doctor, dentist, funeral director) who states the nature of the event that caused (or will cause) your absence.
• in writing, on official stationery, and signed. (I do not return excuses to you.) Telephone calls, FAXes, and e-mails are not acceptable.
• presented prior to the absence for a scheduled event (e.g., university-sponsored activity, recognized religious holiday, military service).
• presented no more than one week after the date of an unexpected absence

When an excused absence is planned ahead, the student should consult with the Professor to be given a pre-test (see below). When the absence is an emergency (medical or otherwise), the Professor and TAs should be notified as soon as possible and the appropriate documentation submitted no later than the next class meeting and any documentation must be presented. In those cases, a make-up test may be given after the original test. This may vary in format and content at the discretion of the Professor, and scheduled in consultation with the student.

Unacceptable Excuses: Only unavoidable absences are excused, so you should schedule routine personal events (e.g., vacations, weddings, reunions, non-emergency medical or dental visits, parent-teacher conferences, household or auto repairs) to avoid conflicts with your classes. Oversleeping is never an acceptable excuse. Employment conflicts are not acceptable excuses for absences, tardiness, or leaving class early. (Once enrolled in a class, it is the student’s responsibility to arrange his or her work schedule so that no regularly scheduled class or examination time is missed.) Texas waives jury duty for students, so jury duty is not an acceptable excuse.

“Pre-Tests”:
Pre-Tests are for some scheduled events (official University business, athletics, military duty, etc.), or an acceptable excuse, you may arrange to take a lecture examination before (but not after) its scheduled date. (You should take a test as close to its originally scheduled time as possible, but you may not take a test more than one week before its originally scheduled time. You must obtain your instructor’s approval at least two weeks before you wish to take the pre-test.) If you arrange to take any test at an alternate time and do not show for that appointment, then you forfeit the opportunity to take the test except at its originally scheduled time. Students who do not arrange to take examinations in advance will not be eligible for this special consideration. A written excuse from the university department involved or from the Office of Student Affairs is required.

The instructor—in consultation with Dr. Eliot Chenaux, Vice President for Student Affairs—will determine if circumstances warrant giving an individual a make-up test after the original test. A make-up test given after the original test may vary in format and content at the discretion of the Professor. The exam day will be scheduled in consultation with the student.

Late Assignments: You may always turn in assignments early. Except for excused absences, late assignments will not be accepted. If you know in advance that you will have an excused absence when an assignment is due, you must turn in that assignment before its due date. You should turn in assignments that were missed because of an unexpected, excused absence as soon as possible.

Any situations for which you cannot provide an acceptable excuse as outlined above (e.g., “I have an excuse, but it is too personal to discuss with you”) will be discussed with Dr. Eliot Chenaux, Vice President for
Student Affairs.

**RELIGIOUS HOLIDAYS:** Any student who will miss class and/or test days because of recognized religious holidays should **notify me as soon as possible** so we can make alternative arrangements. Prior notification is required for such absences to be excused.

**DISABILITY AND VETERANS’ SERVICES:** Texas A&M University-Corpus Christi is committed to providing persons with disabilities an equal opportunity to access campus facilities, resources and programs. The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. Support and accommodations are also available for returning veterans who experience cognitive and/or physical access issues in the classroom or on campus. Our Office of Disability Services arranges such support and academic accommodations. To make a request, or for more information, call (361) 825-5816 or visit Driftwood 101. It is important to contact the Office of Disability Services in a timely fashion as it will take time for them to review requests and prepare accommodations and accommodation letters.

**CLASSROOM ETIQUETTE:** You are adult University students. I will treat you as such, and I will expect you to act as such. You will act with courtesy and common sense. I will not tolerate disruptive, disrespectful, or abusive behavior/language directed toward anyone in this class (i.e., student or instructor). Violations range from talking during class to outright insubordination, and will result in penalties that range from the student being asked to stop to the student being “escorted” from the class - permanently. Cellular phones (including text messaging), pagers, and other “beepers” must be turned off in the classroom and laboratory. (I will make exceptions for certain “emergency” personnel, but you must see me to obtain this.) Children are not allowed in the rooms during lecture or laboratory periods, or when the child’s guardian is working or studying “after hours.”

**ACADEMIC INTEGRITY/PLAGIARISM:** University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in prosecuted to the full extent of University regulations (see the Student Handbook and the Catalog 2010-11: Texas A&M University-Corpus Christi). The following procedures will be enforced:

- You must be prepared to present a photo ID at all examinations.
- Different test forms may be prepared for a single examination. To ensure that the appropriate key will be used to grade your answer sheet, always follow instructions on the test or answer sheet, or given orally by the instructor.
- If you leave an examination room—for any reason—you must hand in your answer sheet and you will not be allowed to resume the examination. Attend to personal matters (e.g., rest room visits) before the examination.
- Be on time! **Anyone arriving after someone has completed an examination and left the room will not be allowed to take that examination.**
- Plagiarism is the presentation of the work of another as one’s own work and will not be tolerated.
ACADEMIC ADVISING: The College of Science & Technology requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. The College’s Academic Advising Center is located in Center for Instruction, Suite 360, and can be reached at 825-6094.

GRADE APPEALS: As stated in the Texas A&M University-Corpus Christi University Rules and Procedures (Section B [Academic Program], Part 13 [Students]: 13.02.99.C2 [Student Grade Appeals] and 13.02.99C2.01 [Student Grade Appeal Procedures]), a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is on the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, consult the University Rules and Procedures specified above (accessible through the University Rules and Procedures website at http://www.tamucc.edu/provost/university_rules/index.html). For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

DROPPING THE COURSE (OR NOT): I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. If you drop the class before the “drop date” (see the online Spring 2011 schedule for more information), you will be assigned a grade of “W.” There are consequences for dropping a class, so read the drop policy in the University Catalog (better still, see your academic advisor and someone in the financial aid office) before you drop any class. In the middle of the semester, you are likely to receive midterm grade reports (either on S.A.I.L. or through some other means). If you have a lower mid-term grade than you wish, it should concern you, but not frighten you. (Remember that there are more opportunities to earn points and boost your grades in the last half of most courses than in the first half.) Talk to your instructors (not to other students) to explore your options. Also note that the mid-term grades posted on S.A.I.L. are not official, not a guarantee and are never updated; once they are posted they cannot be changed even if your grade in the class does change.
RESEARCH PROJECT:
Each lab group (composed of no more than four individuals) will be required to conduct a research project during the semester and will complete both a paper and an oral presentation for that project (see below). The Professor will give a mock presentation in class at the end of the semester to be used as a guideline as to what is expected or the presentation. For the paper, a detailed guideline is given below and it is expected that the students familiarize themselves with the scientific literature as part of the research project.
When working on the group research project and presentation, the workload should be evenly distributed between each member of the group. It is vital that each group member do his/her equal share. It is expected that group members will work together. It is the responsibility of each student to get to know each member of their group and to obtain appropriate information about contacting group members outside of lab. Problems that arise must be worked out within the group if at all possible. If one or more of the group members are not performing to the others’ satisfaction, it is up to the group to document the nonparticipation.
To resolve problems within the group:
1) Try to compromise as a way to work out the problems amongst yourselves.
2) If that doesn’t work, bring the problem to the attention of the TA as soon as possible along with documentation of the issues, and a plan of action as to how the problem(s) should be resolved.
3) Schedule a group meeting with the TA to discuss the problem. This meeting must take place before October 18, 2011.
4) If the meeting does not solve the problem, with the TA’s permission, the group member may be expelled. If the member is not expelled by October 25, 2011, the group is stuck with the problem.
5) A member who is expelled must complete a project, paper and presentation on their own or receive a 0 for the project (both the paper and the presentation). Again, this is up to the group. The TA or Dr. Fahlman cannot initiate this action.
6) Keep in mind that each group member will anonymously evaluate each member of his/her own group. Students receiving less than satisfactory scores from other members of the group may receive significantly lower grades on the paper and/or presentation.

The objective with the research project is to give the students experience with the scientific method. The scientific method is a step-by-step process for asking questions, developing explanations, and testing those explanations against the reality of the natural world. There are five (5) main interrelated operations (steps) in this method: observation, question, hypothesis, prediction and test.
Step 1 Observation: All scientific inquiry begins with observing a specific phenomenon in the natural world.
Step 2 Question: These observations lead to a question, such as “How did that happen?”
Step 3 Hypothesis: A hypothesis is formulated in answer to the question. A hypothesis is a possible explanation, a preliminary conclusion, or even an educated guess as to the solution to the problem. To be useful, a hypothesis must be testable by experimentation or further observations. The hypothesis must be tested in a way that allows it to be proven false. We can never prove that a hypothesis is true, but we can support the hypothesis if repeated experiments do not find it false.
Step 4 Prediction: Typically the prediction is phrased in an "if...then" form. If this happens then logically that will happen.
Step 5 Test: The test stage or experimentation process can include further observations or the testing of the hypothesis against a known situation or element (control). In order to ensure validity of the experiment replicating the experiment is necessary. The results of the experimentation should either support or refute (disprove) the hypothesis.
Once the experiment has been concluded, a conclusion is drawn about the validity of the hypothesis. If the hypothesis is refuted then the hypothesis is revised or a new one is formed. If the hypothesis is supported additional predictions can be made and tested.
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RESEARCH PROJECT PRESENTATION GRADING GUIDELINES:
This portion of the presentation grade (the actual oral presentation) is worth **100 points** (15% of the total grade). The TA and Professor and/or one external reviewer will critique each group. The grades given by the review panel will be averaged. It is expected that all members of a research group participate in the presentation and in case of unexcused absence, points will be deducted from the entire group.

1. DELIVERY (25 POINTS) - The points will be divided between participants. Includes: Personal appearance, attitude, delivery, demeanor, use of the monitor as a prompt instead of the screen (POUNTS WILL BE DEDUCTED FROM STUDENTS USING NOTE CARDS OR READING FROM ANY SOURCE), etc...

2. CONTENT/KNOWLEDGE OF SUBJECT (75 POINTS) - The points will be divided between participants and all group members are required to participate. Includes how well each person knows the material, how well they answer questions, etc.
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## RESEARCH PROJECT POWER POINT GRADING GUIDELINES

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<tr>
<th>Points</th>
<th>Points</th>
<th>Points</th>
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<td><strong>Introduction</strong></td>
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<td>discussion of the problem and hypothesis stated</td>
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<td>material correctly cited on all slides</td>
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<td><strong>Results</strong></td>
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<td>conclusion(s) stated &amp; reason(s) given</td>
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RESEARCH PAPER INFORMATION
Each group should write one research paper that describes the research project. The research paper should follow the standard formatting used for peer-reviewed published papers. While these differ, sometimes considerably, between journals we will use the standards for a journal called Respiratory Physiology & Neurobiology. The choice of this journal is to standardize the formatting for all papers and as the Information Pack, (a pdf file) that provides a detailed Guide for Authors, is very detailed. The Guide can be found at the following website: http://www.elsevier.com/wps/find/journaldescription.cws_home/622727/authorinstructions

The paper should be written as an original research article as outlined in the Guide. While this journal does not limit the number of pages, the body of the paper should be between 10 to 15 double-spaced pages (no larger than 12 pt. font, margins 1 inch). The paper should contain an introduction, a materials and methods section, a results section, a discussion, a reference list, and tables and figures. The 10 to 15-page body of the paper does NOT include the title page, abstract, references list, or tables and figures. This page limitation is the standard length of a published paper and to give students an idea of the amount of material required. The paper will be based on information gathered from a search of current research literature published in scientific, peer-reviewed journals, and on research conducted in lab. While books, abstracts, unpublished results or personal communication are sometimes used as a reference, their use should be limited and peer-reviewed articles should be used whenever possible.

RESEARCH PAPER GRADING GUIDELINES
The research paper grade (the actual oral presentation) is worth 100 points (15% of the total grade). The TA and Professor will evaluate each paper and averaged. It is expected that all members of a research group actively participate in writing the paper. The workload should be divided evenly among the group members.

The Guide for Authors (see above) should be used to determine the format of the paper.

Scientific papers differ considerably from other forms of writing and it may take some time to get used to. The article published by Gopen and Swan (1990) is an excellent guide to scientific writing and highly recommended. The paper will be graded on content, language, formatting, and conclusions. While there may be many interpretations of the results, the conclusion(s) must be defended by actual results and be physiologically reasonable.

The following is a brief outline of the structure of a scientific paper. One common mistake is repetition of results in the discussion and vice versa. Try to avoid this as it makes the paper easier to read and reduces the length.

Title: Think long and hard about the title – it drives your thoughts as to the story you are trying to tell.

Abstract: It will generally write itself once the body of the paper is drafted. Simply pluck out the key words from the text once the rest of the paper is finished and string them together.
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Introduction: There are 3 main sections 1) what is known, 2) what is not known 3) what are the unknowns you are trying to answer.

Material and Methods: The scientific method relies on the ability that someone else should be able to repeated the same experiment so be as detailed as necessary for someone else to do the same study. In short, what you did and how you did it.

Results: Describe the actual results as concisely as possible. Rather than creating a long list of items, consider using figures and tables. Often points that belong in the discussion creep in to the results. Don’t let this happen. Push them into a resource pile for use in the discussion.

Discussion: 1a) The first section of the discussion defines the paper. The first sentence of that paragraph encapsulates what you discovered, 2a) the subsequent sentences lay out a series of issues that need discussing in logical sequence: data quality, variables you could not control, alternative interpretations etc. Each sentence in that first paragraph defines a subsequent paragraph detailing each issue. Then at the end you wrap up with a conclusive paragraph telling the world what we now know that we did not before. Three sections again: 1) first a summary of what needs to be discussed, 2) then a series of paragraphs discussing each of those needs, and 3) then a wrap up.

References: Formatting the references should be done last and make sure that all the references cited in the text are in the reference list. There are software packages that makes life easier (Endnotes or Reference Manager). However, these are quite costly and require considerable effort to learn how to use, so manual insertion of the references is probably just as effective.

Tables and figures: Data are often presented in tables of figures rather than in the text. Both should have a legend that describes what they contain, and abbreviations. A common mistake is to include too many tables and figures. Try to organize data into averages and present only those data that provide you with information to tell the story. A regular published paper generally contains about 1-4 tables and 2-6 figures. Any additional data is probably superfluous and should not be reported.

The following is a grading guideline for each section:
1. TITLE PAGE, ABSTRACT AND OVERALL Formatting (5 POINTS) – Make sure that you following the formatting for Respiratory Physiology and Neurobiology as detailed above.

2. INTRODUCTION (20 POINTS) – The points will be divided between participants and all group members are required to participate. Includes how well each person knows the material, how well they answer questions, etc.

3. MATERIAL AND METHODS (20 POINTS) - The points will be divided between participants and all group members are required to participate. Includes how well each person knows the material, how well they answer questions, etc.
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4. RESULTS (10 POINTS) - The points will be divided between participants and all group members are required to participate. Includes how well each person knows the material, how well they answer questions, etc.

5. DISCUSSION (30 POINTS) - The points will be divided between participants and all group members are required to participate. Includes how well each person knows the material, how well they answer questions, etc.

6. REFERENCES AND REFERENCE LIST (5 POINTS)

7. TABLES AND FIGURES (10 POINTS)

REFERENCES