BIOLOGY 314—Cell Biology (4 Credits)
Syllabus for Fall 2012 (Semester I, 2012-2013)

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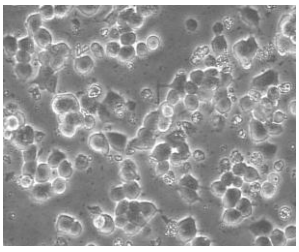
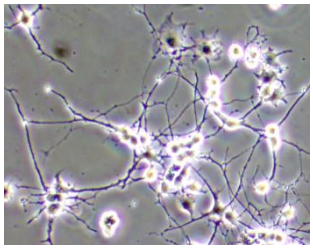
Office Hours, TRF 10:00-11:00 AM
and by appointment

The images displayed above show undifferentiated rat adrenal tumor (PC-12) cells (left), and PC-12 cells induced to differentiate into a neuronal phenotype by exposure to Nerve Growth Factor (from Experiment 11 in *Experimental Cell Biology 2012*, the Biology 314 lab manual).

In Biology 314, we explore the biology of cells at the structural, biochemical and molecular levels. Cell Biology is designed primarily as a junior/senior-level course for Biology and Biochemistry majors.

As the instructor, I will endeavor to:

- present material in a clear, straightforward and enthusiastic style.
- foster a stimulating and comfortable learning environment in the classroom, one the promotes mutual respect between students and instructor.
- encourage students to ask questions, participate in classroom discussions, and offer their own insight.
- clarify coverage of materials on exams as well as expectations for lab reports.
- devise exams and clicker quizzes that are challenging yet fair.
- evaluate and score exams and lab reports in a fair and consistent manner.

As a student in Biology 314, your goal for the semester is to build a knowledge base for understanding:

- how biologists investigate the structure and function of cells by visualizing them with light and electron microscopes, by fractionating them using centrifugation techniques, and by culturing them in the laboratory.
- how cells adhere to one another and to their surrounding matrix via specific adhesion proteins and junctions.
- how membranes are constructed from lipid, protein and carbohydrate components, and how ions and small molecules get across biological membranes including the plasma membrane and organelle membranes.
- how specific cellular junctions control occlusion between cells and communication between cells.
- how specific mechanisms govern the import of proteins into membranes and organelles, the trafficking of vesicles between membranes, the secretion of proteins, and the uptake of proteins via endocytosis.
- how the biochemical energetics of living cells depends upon the generation of ATP via substrate-level and oxidative phosphorylation, and how the latter is dependent upon a chemiosmotic proton-motive force.
- how specific transduction mechanisms and cascades of cellular events control the short-term and long-term responses of cells to signaling molecules such as hormones and growth factors.
- how microfilaments, microtubules and intermediate filaments are involved in the organization of the cytoplasm of eukaryotic cells, and how microfilaments and microtubules play crucial roles in cellular movements.
- how the eukaryotic cell cycle is regulated, and how cells undergo programmed cell death via apoptosis.

By semester's end, students should be able to define key terms, describe processes, explain principles, analyze and interpret observations/data, and apply knowledge pertaining to each of the following topics:

- Light microscopy techniques, including bright field, dark field, phase-contrast, differential interference contrast, fluorescence and confocal microscopy, as well as scanning and transmission electron microscope techniques
- Resolution as related to light and electron microscopy
- Prokaryotic/eukaryotic cell structure and recognition of cell structures in light and electron photomicrographs
- Endosymbiont theory pertaining to origin of the nucleus, endoplasmic reticulum, mitochondria and chloroplasts
- Functions of cell structures common to both prokaryotic and eukaryotic cells

- Functions of cell structures and organelles unique to eukaryotic cells
- Fractionation of cellular components using differential and density-gradient centrifugation
- Animal cell culture techniques and the production of monoclonal antibodies
- Classes of adhesions proteins involved in cell-cell and cell-matrix adhesion mechanisms
- Structure and function of cell matrix proteins—collagens and multiadhesive matrix proteins (laminin, fibronectin)
- Role of integrins, adhesion proteins and proteoglycans in cell-cell and cell-matrix adhesion mechanisms
- The fluid mosaic model of membrane structure, the classes and structures of lipids found in membranes, lipid bilayer asymmetry, the classes and structural levels of proteins found in membranes, experimental evidence for the mobility of lipids and proteins in membranes, and glycoproteins with N- vs. O-linked oligosaccharides
- Protein folding and mechanisms to correct misfolding, and the role of proteasomes in protein degradation
- Freeze-fracture electron microscopy as means of providing evidence for suspended membrane proteins
- Red blood cell membrane structure and function
- Gel electrophoresis, Western blotting, and antibody detection as means of probing membrane composition
- Mechanisms for transporting ions and small molecules across membranes and the classes of proteins that mediate these—ATP-powered pumps, ion channels, uniporters, symporters and antiporters
- The kinetics of carrier-mediated transmembrane transport
- Liposomes as means of investigating the activity of isolated and purified transport proteins
- Role of aquaporins in the movement of water across biological membranes
- Integration and cooperativity among transport systems and the role of tight junctions
- Transport mechanisms involved in the resting potential and in generating the action potential of nerve cells
- Patch-clamp techniques as means of investigating the function of ion channels
- Structure and function of the myelin sheath, chemical versus electrical synapses, voltage- vs. ligand-gated channel proteins, and gap junctions vs. plasmodesmata
- Structure and function of tight junctions, gap junctions and plasmodesmata
- Mechanisms governing the targeting of proteins for import into specific cellular compartments, including the rough endoplasmic reticulum, lysosomes, the Golgi, the plasma membrane, the cell exterior (secretion), mitochondria, chloroplasts, peroxisomes and nuclei
- Post-translational versus co-translational import of proteins into cellular compartments
- Topology of proteins inserted into the rough endoplasmic reticulum, the Golgi and the plasma membrane
- Structure and function of nuclear pores, and the nucleosomal organization of chromatin
- The processing and sorting of glycoproteins in the Golgi body, and the synthesis of N-linked oligosaccharides
- The vesicular transport model versus the cisternal maturation model of Golgi function
- Roles of COPI-, COPII-, and clathrin-coated vesicles in protein trafficking
- The coating, formation, budding, pinching off, uncoating, movement, and docking of vesicles within cells
- The formation of lysosomes from coated vesicles pinched off the trans Golgi network
- Receptor-mediated endocytosis and the uptake of LDL particles and iron by mammalian cells
- Structure and role of ATP as energy “currency” in cells
- Chemiosmotic coupling as universal means of ATP production in cellular respiration and photosynthesis
- Structure of mitochondria and chloroplasts and division of labor within these organelles
- Role of proton gradients in transmembrane transport mechanisms and bacterial flagellar movements
- Reaction mechanisms essential to energy-harvesting in glycolysis, pyruvate oxidation and the citric acid cycle
- Components and electron flow associated with respiratory and photosynthetic electron transport systems

- Experimental evidence supporting chemiosmosis, including proton movement and function of ATP synthase
- Transduction mechanisms that signal short-term cellular responses versus transduction mechanisms that involve the control of gene activity and affect longer-term cellular responses
- The roles of second messenger molecules (cAMP, cGMP, DAG, Ca^{2+}, IP_3) in cell signaling mechanisms
- The role of trimeric G-proteins and the "collision-coupling" mechanism in cell signaling mechanisms
- The roles of adenylate cyclase, cAMP, protein kinase A, a "cascade" of cellular proteins, CREB-binding proteins, and cyclic AMP response elements in the stress-induced response to the hormone epinephrine (adrenaline)
- Signal transduction mechanisms implicated in the chemotactic crawling movements of slime mold amoebae
- Roles of calcium ions, phospholipase C, DAG, IP_3, calmodulin, and nitric oxide in smooth muscle relaxation
- Programmed cell death via apoptosis versus cell death through necrosis, and the role of apoptosis in cancer
- Structural distinctions among the three types of eukaryotic cytoskeletal filaments—microfilaments, microtubules and intermediate filaments, and how they are assembled from their corresponding protein subunits
- Classes of myosins and their roles as microfilament-motor proteins
- Myosin-actin crossbridge cycle and its role in muscle contraction, and the role of Ca^{2+} ions in muscle contraction
- Roles of microfilaments in animal cell cytokinesis, cytoplasmic streaming, and amoeboid crawling movements
- Classes of kinesins and dyneins and their roles as microtubule-motor proteins
- Structure and function of the "9+2" flagellar/ciliary axoneme, and the roles of dyneins and nexin in movement
- Microtubule and motor protein dynamics associated with chromosome separation during anaphase
- Classes of intermediate filaments and their roles in tissue strength and integrity and nuclear organization
- The eukaryotic cell cycle and its regulation, cell-cycle checkpoints and the development of cancer

The degree to which students have succeeded in meeting course goals and outcomes will be evaluated by the instructor using the following assessment tools:

- Lecture attendance and preparation as gauged by in-class clicker quizzes
- Scheduled Wednesday evening exams and the final (non-comprehensive) exam
- Written laboratory reports (full as well as partial reports)

In order to adequately prepare for these assessments, students should study lecture and lab materials on a regular basis and, for each unit in the course, should be able to:

- describe, explain and apply principles, concepts and information conveyed in figures and tables organized into classroom PowerPoint presentations, including descriptions of figures/tables in unit guides and elaborations of these descriptions present in class by the instructor.
- answer assigned chapter-end problems from the textbook, including variations of these questions.
- answer assigned sample exam questions.
- answer questions based on experiments performed in the laboratory, including background, methods, expected results, interpretations of results, and conclusions.
- answer questions based on assigned animations and videos from Cell Biology Interactive (accessible via the campus network and the Garland Science website) and from supplementary sources (posted on D2L). To access Cell Biology Interactive, proceed as follows from any campus computer workstation: Start → All Programs → UWSP Application Center → Cell Biology Interactive 5.1 → Run. Alternatively, access Cell Biology Interactive videos and animations from the Garland Science website (you must register a username and password to access resources at this site): http://www.garlandscience.com/garlandscience_student/student_home.jsf;jsessionid=vOZuf2RFycCMRsMnaO3lVg__.2b16d981-36f7-3b57-b5bf-377d72fc7d2e?landing=student
- prepare lab reports according to the guidelines provided in this document, in the lab manual, and by the instructor.

Course Mechanics and Policies

- My **office** is 446 TNR, and my **office hours** are TRF from 10:00 to 11:00, and by appointment. I encourage students to meet with me whenever they have questions about course materials, concerns about their performance, or any other issues affecting their success in the course.

- **Lectures** are on Tuesdays, Thursdays and Fridays, from 9:00 to 9:50 AM in Room A208 Science Building. Lectures are digitally recorded and posted on the course D2L website for *review purposes only*. Listening to lecture recordings does *not* substitute for regular attendance of lectures and preparation for class.

- **Labs** are taught from 13:00 to 16:50 (1:00 to 4:50 PM) in Room 454 of the TNR Building. Lab sections 1, 2 and 3 meet on Tuesdays, Wednesdays and Thursdays, respectively. Labs begin the week of September 4. Bring the lab manual to each and every scheduled lab session, beginning the first week of class.

- The **D2L Website** is located at http://www.uwsp.edu/d2l/Pages/default.aspx. Important information, including unit guides, PowerPoint slide sets, information about exams and lab reports, sample exams, files pertaining to lab work, lecture and review recordings, and other relevant course materials are posted on D2L. Biology 314 is neither an on-line nor a hybrid course; accessing materials posted on D2L is *not* a substitute for regular attendance in lecture and lab.

- The **Text** is *Molecular Biology of the Cell*, 5th Edition by Alberts, Johnson, Lewis, Raff, Roberts, and Walter (2008, Garland Science, New York/Oxford). Obtain the text through text rental at the UWSP Bookstore in the Dreyfus University Center. Frequent references to figures, photographs and tables in the textbook will be made in class. These images are organized in PowerPoint Slide sets for display in class using a computer and an LCD projector. The PowerPoint files are posted on the Biology 314 D2L website. Print out the appropriate PowerPoint slide sets as handouts and bring them to class.

- The companion **Media DVD-ROM** for *Molecular Biology of the Cell* includes supplementary chapters to the text (Chapters 21 through 25) dealing with multicellular systems (not covered in the course), and the Cell Biology Interactive Media Player. The DVD-ROM may be used to access Cell Biology Interactive animations and videos on your home PC, Mac, or laptop. On campus, access Cell Biology Interactive via the network menu (Start → All Programs → UWSP Application Center → Cell Biology Interactive 5.1 → Run). As an alternative for accessing Cell Biology Interactive from your home PC, Mac, or laptop, go to the Garland Science website (http://www.garlandscience.com/garlandscience_student/student_home.jsf?landing=student) and register as a student. If the bookstore issued you the Media DVD-ROM and you prefer not to use it (you will be charged if it is lost), return it to the bookstore.

  The Media DVD-ROM also includes Chapters 21—25 of the text in pdf format. These chapters are not included in the print version of the text and are not covered in class. These additional chapters, which may be of interest to some, cover sexual reproduction, development, specialized tissues and stem cells, pathogens and immunity, and the immune system.

- The **Lab Manual** is *Experimental Cell Biology 2012* by Ed Gasque. Purchase the manual at the UWSP Bookstore in the Dreyfus University Center before your first lab session (the week of September 4) and bring it with you to each lab session of the semester. The cost of the lab manual is $12.00.

- **Clicker Quizzes** are used to monitor lecture attendance and preparation for class. You are required to lease a clicker for the semester at a cost of $8.00. The fee is automatically added to your UWSP student bill. You will need your UWSP Student ID to lease a clicker. Clickers are available through the **Help Desk** in **LRC Room 023**. Further details are found at http://www4.uwsp.edu/IT/Content/GetInformation.aspx?View=wmsFacView&Content=Clickers&SubTopic=xxn12102nxxStudentInformation.

  All students must start bringing clickers to lecture beginning Thursday, September 6; an initial test to determine whether or not your clicker is working properly will be conducted at the start of the lecture period on Thursday. Subsequently, each lecture session, beginning on Friday, September 7, will begin with a clicker quiz. Each clicker quiz will consist of four questions based on information from the previous lecture. If a student answers all four questions correctly, he/she receives a "clicker score" of 5. If a student answers three, two, or one of the questions correctly, he/she receives a "clicker score" of 4, 3, or 2, respectively. If a student does not answer any of the clicker questions correctly but is still present in class and submits clicker responses, he/she receives a "clicker score" of 1. If a student is absent from lecture and fails to provide a valid reason for the absence, he/she receives a "clicker score" of zero. If a student is absent from lecture and provides the instructor, via email, a valid reason for the absence, he/she receives a "clicker score" of 1. If a

student forgets to bring their clicker to lecture, he/she can receive a "clicker score" of 1 for attendance by informing the instructor of their presence at the *end* of the lecture period. On ***no more than one occasion*** during the course of the semester, a student who forgets to bring their clicker to class is permitted to write their name, the date, and their responses to quiz questions on a sheet of paper and submit it to the instructor at the end of the lecture period. If a student's clicker is not functioning correctly during lecture, he/she is permitted to submit written responses to quiz questions; however, the malfunction must be corrected or the clicker replaced by the *next lecture period*. If, at any time during the semester a student obtains a new clicker, he/she must inform the instructor at the start of the lecture period so that the new device is added to the classlist; otherwise, no responses will be recorded for a new clicker.

Clicker quizzes are worth a total of 100 points for the semester. A student's clicker quiz total for the course is determined by dividing the sum of all of his/her "clicker scores" by the total possible "clicker score" sum for the semester, multiplied by 100 and rounded to the nearest 0.1 point. For example, let's say that there are 40 clicker sessions during the semester. Since a student could earn a maximum "clicker score" of 5 for each session, the total possible "clicker score" sum for the semester is 40 x 5 or 200. Let's say that, for a particular student, the sum of all of his/her "clicker scores" for the semester is 171. The final clicker quiz total earned by this student for the semester would be calculated as follows:

171/200 x 100 = 85.5 points

Exam Review Sessions are scheduled for the following dates and times (two days prior to each exam).

- Exam 1 Review: Monday, September 24, 6:00 to 8:00 PM, Science A208
- Exam 2 Review: Monday, October 29, 6:00 to 8:00 PM, Science A208
- Exam 3 Review: Monday, November 26, 6:00 to 8:00 PM, Science A208
- Exam 4 Review: Tuesday, December 18, 7:00 PM, Science A208

- **Exams** are scheduled for the following dates and times. There will be four exams, and each will consist of 100 possible points plus 2 to 4 bonus points for a built-in curve. Each exam will cover lecture as well as lab materials. One week prior to each exam, students will be given information regarding coverage of specific lecture and lab materials. Each of the four exams will be comprised of two parts: a multiple-choice, scantron-scored section (Part A), and a written portion (Part B) made up of short-answer and short-essay questions. The distribution of points between Part A/Part B will vary from approximately 20/80 to approximately 80/20, not including bonus points. The number of multiple-choice questions on Part A will also vary, from approximately 35 to 115, and the point-value of each question will be based on the total points that can be earned on Part A. The point-value of each multiple-choice question has a decimal value. Access to sample exams (i.e., exams given in the course during the Fall 2010 semester) are provided on the D2L website.

  - Exam 1: Wednesday, September 26, 6:00 to 9:00 PM, TNR 120
  - Exam 2: Wednesday, October 31, 6:00 to 9:00 PM, TNR 120
  - Exam 3: Wednesday, November 28, 6:00 to 9:00 PM, TNR 120
  - Exam 4: Thursday, December 20, 2:45 to 4:45 PM, Science A208

- Regarding **Make-up Exams**, each student must take all four of the scheduled exams; no make-up exams are given.

- **Attendance in Lab** is required and recorded for each lab session. Unless a valid, documented excuse (e.g., illness, family emergency) is provided, a penalty of 10 points will result for each lab absence. Arrangements can often be made with the instructor for a student to attend an alternate lab section, thus avoiding a penalty.

- **Lab Reports** are prepared **individually** by students, and each student must prepare **two "full" lab reports *and* eight "partial" lab reports** over the course of the semester. For the Fall 2012 semester, students must prepare **"full" lab reports** for ***Experiment 5 and Experiment 8***, and **"partial" lab reports** for ***Experiments 1, 4, 6, 10, 11, 12, 13, and 15 (apoptosis study)***. "Full" lab reports are worth 35 points each, while "partial" lab reports are worth 10 points each. ***Due dates will be announced in class and posted on the Biology 314 D2L website.***

  Submit "full" lab reports in computer-printed form, back-to-back on standard 8½ by 11-inch white sheets, using Arial, Times New Roman, or Calibri 10- to 12-point font, with one-and-a-half line spacing, and 0.75-inch or 0.5-inch margins. Each report must include the following sections and components. One or more sample "full" lab reports will be accessible via the D2L website. Submit "partial" reports in computer-printed and/or neatly hand-written form.

Retain an electronic file and/or physical copy of each "full" and "partial" report as a precaution in the event of loss or misplacement. **It is recommended that students keep a record of experimental data and observations in a separate lab notebook (not evaluated) for use in preparation of the lab reports and exams.** Also, please keep in mind that exams will include questions which focus on the background, methods, expected results, conclusions and interpretations of the experiments performed in lab. Lab materials covered on exams include all of the experiments that are performed in class—both those for which lab reports are required and those which do not require lab reports.

Submit lab reports in the appropriately labeled box located outside the instructor's office (TNR 446) by the due date and time indicated for each report. Periodically, as reports are placed in the box, papers will be moved into the instructor's office and kept in a file cabinet for safe keeping. Lab reports that are submitted past the due date will be subject to penalties. Two (2) points will be deducted for each day that a "full" lab report is submitted past the due date. One (1) point will be deducted for each day that a "partial" lab report is submitted past the due date. Once a particular graded lab report is returned to the class, late reports will not be accepted and will receive a score of zero.

Each of the "full" lab reports must include the following sections and components:

- **Basic Information (place in top right corner or report)**
  - Your name**,** lab section (T, W or R), the date of submission, and the names of team members
  - The experiment number and title, and the date(s) on which the experiment was performed

- **Materials and Methods**
  - Citation of specific pages where materials and procedures are listed in the lab manual
  - Very brief descriptions of any modifications made to procedures, if applicable.

- **Results**
  - Completion of the items in the Lab Report Checklist from the lab manual, including neatly prepared and clearly labeled sketches, captions, descriptions, image prints and/or interpretive sketches, tables, and graphs, as specified at the end of each experiment.
  - The instructor will provide an updated Lab Report Checklist, if necessary, to specify additional or alternate items required in a report, or to identify items listed in the manual that are not required in a report.
  - Sketches may be scanned and inserted electronically or physically cut out and neatly pasted (using transparent tape) into the report. Alternatively, sketches may be redrawn for lab reports.
  - Identify/label your sketches and tables with figure numbers and table numbers. For example, Figure 1, Figure 2, Figure 3 (or Fig. 1, Fig. 2, Fig. 3), etc., and Table 1, Table 2, Table 3, etc.

- **Summary of Key Findings/Conclusions and Summary of Significance**
  - A summary of key findings in the experiment and the conclusions drawn from these findings, written in the form of a numbered or bulleted list using complete sentences. If a particular finding or conclusion pertains to and/or was drawn from information conveyed in a specific figure and/or table, then cite that figure or table in parentheses following the sentence (e.g., Fig. 3, Table 2).

  - A detailed summary, **two or three paragraphs in length written in complete sentences**, of the significance of the experiment, and how specific materials (topics, figures, tables, slides) covered in lecture aided and enhanced your understanding of the methods, results and conclusions associated with the experiment. Cite specific figures/tables from the text and/or slide numbers in the case of supplementary figures/tables not in the text.

- **References**
  - The only references that you need to cite are the lab manual (for citation of protocols) and the text (for citation of material that aided and enhanced your understanding of the lab work).
  - Cite the text and lab manual as follows:
    - (1) Alberts, B., *et al.* 2008. *Molecular Biology of the Cell*, Fifth Edition. New York: Garland Science.
    - (2) Gasque, E. 2012. *Experimental Cell Biology 2012*. Stevens Point: Printing and Design.

    In the case of the text, citation of figure and table numbers within the body of the significance section is sufficient; citation of page numbers is not necessary. Cite supplementary figures by slide set and slide number. Cite materials and procedures by experiment number in the lab manual (page numbers are not necessary).

Each of the "partial" lab reports consists soley of the two sections and components listed below:

- **Basic Information (place in top right corner or report)**
  - Your name**,** lab section (T, W or R), the date of submission, and the names of team members
  - The experiment number and title, and the date(s) on which the experiment was performed

- **Results**
  - Completion of the items in the Lab Report Checklist from the lab manual, including neatly prepared and clearly labeled sketches, captions, descriptions, image prints and/or interpretive sketches, tables, and graphs, as specified at the end of each experiment.
  - The instructor will provide an updated Lab Report Checklist to specify specific items required in a report.
  - Sketches may be scanned and inserted electronically or physically cut out and neatly pasted (using transparent tape) into the report. Alternatively, sketches may be redrawn for lab reports.
  - Identify/label your sketches and tables with figure numbers and table numbers. For example, Figure 1, Figure 2, Figure 3 (or Fig. 1, Fig. 2, Fig. 3), etc., and Table 1, Table 2, Table 3, etc.

- The breakdown and distribution of Points that can be earned in the course are summarized below.

Clicker Quizzes:	100 points (calculated as described previously)
Exams:	400 points (4 exams, 100 points each)
"Full" Lab Reports:	70 points (2 reports, 35 points each)
"Partial" Lab Reports:	80 points (8 reports, 10 points each)
Total:	**650 points for the course**

- **Extra Credit** is *not* available to *any* member of the class. Students are encouraged to prepare for and perform to the best of their abilities on those assessments which are used to evaluate *all* members of the class *fairly and equally*—regular class attendance and preparation (as gauged by clicker quizzes), exams, and lab reports.

- Your **Biology 314 Grade** is determined by dividing the total number of points that you earn by **650**, then multiplying by 100, and rounding to the nearest 0.1%, and finally by applying the following grading scale strictly and without exception.

91.0-100 A	71.0-78.9 C
90.0-90.9 A-	70.0-70.9 C-
89.0-89.9 B+	69.0-69.9 D+
81.0-88.9 B	60.0-68.9 D
80.0-80.9 B-	00.0-59.9 F
79.0-79.9 C+	

- Grades of **Incomplete** (I) are given only under extenuating circumstances. Students are expected to meet course deadlines as scheduled or arranged by the instructor. A request for a grade of incomplete must be provided in writing, along with a signed note from a physician (in the case of a medical situation) or a family member (in the case of a family emergency). The instructor reserves the right to deny a grade of incomplete in the absence of sufficient justification.

- According to the U.S. Census Bureau (*Current Population Survey*, March 2005), less than 20% of the U.S. population 25 years or older attained a baccalaureate degree. Upon graduation you will join that select group. The professional responsibilities that come with a college degree include an expectation that you will play a role in upholding high ethical standards in society. Your **responsibilities** in this course include the following:
  - You will adhere to the **Student Academic Standards** outlined in Chapter UWS 14 of the *Wisconsin Administrative Code* (http://www.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap14.pdf).
  - **Cheating** or **plagiarism** related to any of the course assessments will result in a score of zero for that assessment.
  - You will strive to attend class regularly and arrive promptly for the start of class.
  - You will strive to study course materials on a regular basis and complete assignments on time.
  - You will silence the ringer on your cell phone whenever you are in the classroom (lecture and lab). You will not place or answer calls, send or receive text messages, or access voicemail while you are in the classroom (lecture room as well as the laboratory).
  - You will not use iPods or other mp3 players while you are in the classroom or while taking exams.
  - You will not talk excessively in class while the instructor is speaking, unless you are asking a question or participating in class discussions. You will not sleep in class.

Sequence of Lecture Units—PowerPoint Slide Sets (Chapters/Topics from Molecular Biology of the Cell, Fifth Edition)

- First Unit: Chapters 9-8-19, Visualizing Cells, Separating Cells, Cell Adhesion and the Extracellular Matrix
- Second Unit: Chapter 10, Membrane Structure
- Third Unit: Chapter 11, Membrane Transport of Small Molecules and Electrical Properties of Membranes
- Fourth Unit: Chapters 12 & 13, Intracellular Compartments and Protein Sorting & Intracellular Vesicular Traffic
- Fifth Unit: Chapter 14, Energy Conversion: Mitochondria and Chloroplasts
- Sixth Unit: Chapters 15 & 18, Mechanisms of Cell Communication & Apoptosis
- Seventh Unit: Chapters 16 & 17, The Cytoskeleton and Cell Motility & The Cell Cycle

Lab Schedule for the Fall 2012 Semester (beginning dates in boldface font, continuing dates in regular font**)**

Experiment #	**Experiment Title and Page Numbers in *Experimental Cell Biology 2012***	**Date(s), T-W-R**
Experiment 1	*Light Microscopy—Observations of Cells using Bright Field, Phase-Contrast, Dark Field, Differential Interference Contrast, and Fluorescence Microscopy*	**September 4-5-6** September 11-12-13
Experiment 2	*Animal Cell Culture Techniques and the Visualization of Cadherin-Mediated Cell Adhesions in Embryonic Chick Fibroblasts using Indirect Immunofluorescence*	**September 11-12-13** September 18-19-20 September 25-26-27
Experiment 3	*Isolation of Erythrocyte Membranes and Observations of Normal, Crenated and Lysed Red Blood Cells*	**September 18-19-20**
Experiment 4	*Analysis of Erythrocyte Membrane Lipids using Thin-Layer Chromatography*	**September 25-26-27**
Experiment 5	*Analysis of Erythrocyte Membrane Proteins by Gel Electrophoresis and Visualization of Glycosylated and Non-Glycosylated Forms of Aquaporin 1 using Blotting Techniques*	**October 2-3-4** October 9-10-11
Experiment 6	*Use of a Fluorescent Glucose Analog to Study the Kinetics of Glucose Transport into Cultured Human Leukemia (HL-60) Cells*	**October 9-10-11**
Experiment 7	*Targeting Protein Movement into Specific Cellular Compartments*	**October 16-17-18** October 23-24-25
Experiment 8	*Electron Transport in Mitochondria Isolated from Bovine Heart Muscle Tissue*	**October 16-17-18** October 23-24-25
Experiment 9	*Experimental Evidence for Chemiosmosis in Mitochondrial and Chloroplast Systems: Effect of a Proton Ionophore on ATP Synthesis in Submitochondrial Particles and Light-Induced Proton Pumping in Thylakoids Isolated from Spinach Leaves*	**October 16-17-18** October 23-24-25
Experiment 10	*Qualitative and Quantitative Investigations of Chemotactic Responses in Cellular Slime Mold Amoebae: The Role of Cyclic Nucleotides*	**October 30-31-Nov 1** November 6-7-8
Experiment 11	*Cell Signaling in Rat Adrenal Cells in Relation to Neuronal Differentiation—Acetylcholinesterase Activity in Differentiated versus Undifferentiated Cells*	**November 6-7-8** November 13-14-15
Experiment 15	*Studies of Apoptosis and Cell Cycle Regulation using Human Leukemia (HL-60) Cells*	**November 27-28-29** December 4-5-6
Experiment 12	*Chemical Requirements for Recovered Motility in Demembranated Flagella*	**December 4-5-6**
Experiment 13	*Chemical Requirements for the Contraction of Glycerinated Muscle Myofibrils*	**December 11-12-13**
Experiment 14	*A Study of Amoeboid Movement in Naegleria gruberi*	**December 11-12-13**