SCIENCE OF NATURE- II
SCI 102

SPRING 2014-2015

Instructors: Assoc. Prof. Hakan Usta, Assoc. Prof. Murat Durandurdu, Prof. Dr. Yusuf Baran

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Office hours: 14:00-17:00 Wednesday (Room: A001 or A211)

Teaching Assistants (E-mails): Duygu Tahaoğlu, Miray Ünlü, Mustafa Erkartal, Yemliha Altıntaş, Murat Çelik (A001)

Class hours:

Section 1 (B212): Monday, 10:00 – 11:50; Wednesday, 13:00 – 13:50
Section 2 (B212): Monday, 13:00 – 13:50; Wednesday, 10:00 – 11:50

Recitation hours:

Section 1(B212), Section 2(B213): Friday, 09:00 – 10:50

Course web page: http://www.agu.edu.tr/courses/sn102

Information on website includes:

- Announcements
- Homework assignments
- PowerPoint lecture presentations
- Exams and solutions (including practice exams)
- Course schedule
- Posted scores
- Grading policies
- Help resources (Recitation hours, office hours, etc.)

Course textbook:

- Chemistry in Context: Applying Chemistry to Society - McGraw-Hill (weeks 1-5)
- College Physics: Reasoning and Relationships, 2nd Edition by Nicholas Giordano (weeks 6-12)
- Biology, Campbell and Reece, Pearson Press (weeks 13-14)

Other recommended textbooks:

- General Chemistry: Principles and Modern Applications by Ralph H. Petrucci, F. Geoffrey Herring, Jeffry D. Madura, Carey Bissonnette (weeks 1-5)
- Chemistry by Raymond Chang, Kenneth Goldsby (weeks 1-5)
- Jewett and Serway, Physics for Scientists and Engineers (weeks 6-12)
- Ohanian, Physics for Engineers and Scientists (weeks 6-12)

Reserve Material:
The textbook and student study guides are on the course reserve shelf in the library. From time to time, journal articles and book chapters may be included as required reading in the course. They will be available on reserve.

Exam dates and times:
Midterm I: To be determined
Midterm II: To be determined
Midterm III: To be determined
Homeworks and quizzes are on weekly basis throughout the semester

Grading:
The final grade will be determined numerically by averaging your scores with the following weights:

Midterm I: 15+5 (small project) %
Midterm II: 15+5 (small project) %
Midterm III: 15 %
Homework: 15 %
Quiz: 10 %
Recitation: 10 %
Attendance: 10 %
Bonus: 5 %

Most grades given during the course of the term will be based on a 100-pt scale. The **official decimal class grades** (0.0 - 4.0) will be determined from a weighted average of your individual grades.

Course objectives:
Scientific inquiry, complexity, critical thinking, mathematical and quantitative reasoning. The specific objectives are:

(a) Demonstrate an understanding of the theory and concepts central to the study of a partic- ular area or topic treated by the natural sciences.
(b) Understand how to formulate a testable hypothesis and design an informative experiment to explain phenomena observed in the natural world.
(c) Be able to interpret data from scientific experimentation both qualitatively and quantita- tively, in order to derive conclusions appropriate to the scope and quality of data.
(d) Be able to recognize limitations of experimental and observational methods and understand concepts of probability, causation, and correlation.

Workload

The course requires a significant time commitment from you. This commitment is both in terms of preparing/reading before lectures and reviewing the material and doing problems after the lecture. Not every topic will be covered in great detail, but there is an understanding that you will explore each topic in greater depth through solving problems.

Class Participation:
Significant class time will be spent in discussion, workgroup problems, active learning exercises, and in-class problem solving. Students will be assigned grades based on their preparation for, and participation in, these class activities. *If you are missing from class, you cannot make up these in-class participation grades.*

Short daily quizzes:

Occasional short quizzes will be given covering the material from the previous class, homework, or preparatory material for class. These may take the form of short paper quizzes. *Missed in-class quizzes cannot be made up, regardless of the excuse.*

Homework Problems:

There will be 10 homework problem assignments given during the term.

Exams:

The three mid-term examinations will each be based upon approximately one-third of the course material. The exams may be mixtures of quantitative problems, short answer questions, multiple choice, and short essay questions. A calculator will be needed for the exams. You **may not** use a smart phone or other network device for this purpose. *You will be allowed to bring in one paper of equations, constants, etc., to be used during the exams and to be handed in along with them.*

Classroom Rules:

These basic rules, in addition to the requirements of the Student Handbook, apply to the instructor and all students at all times in the classroom. If you cannot observe them at any time, you are expected to leave the classroom:

- No use of any electronic devices including smart phones, laptops, tablets, cameras etc. during class. If you use any of these devices, you may be asked to leave class.
- No headphones, blue tooth earphones, etc. in the classroom.
- No cell-phone calls, texting, rings, musical interludes, etc., during class.
- All views are to be heard and engaged respectively. As scholars, we are expected to analyze subject matter critically and express reasonable positions that are based on logic and fact rather than on emotion. **In no case are *ad hominem* arguments permitted in SCI 102.**

Attendance Policy (Class & Exams):

Any excuse for missing an exam *other than illness or family emergency* must be cleared with instructors at least one week ahead of time. (Vacation and leisure trips will not be accepted as excuses – don't bother asking.) If you cannot attend class on an exam day because of illness or emergency, you are expected **before class** to contact us by phone or leave us an e-mail message. Failure to notify us in one of these ways will result in you not receiving consideration for a make-up examination. Regular class attendance is expected, although roll calls will not be generally taken. If you are not present to participate in class discussions, daily short quizzes, active learning exercises, work group discussions and/or presentation of a "homework" exercise, that will, of course, profoundly affect your grade on that assignment. *Missed in-class work (for whatever reason) cannot be made up. Do not bother asking about exceptions to this rule.*

All students should attend at least 70% of the courses. Failure to do so will result in F grade.

Verification of Medical Condition:

Excuses for a class or exam absences for medical reasons will be given only if such absences are advised by a health care provider, based on clinical findings and prescribed treatment recommendations.

Disability accommodation policy:

To request academic accommodations for a disability, students must contact Dean of Students Office. Students must provide documentation of a disability prior to receiving accommodations. It may take a week or two to set up an accommodation so do it ASAP.

Academic Honesty:

The highest standards of academic honesty will be expected in this class. Cheating and plagiarism in any of their forms are unacceptable. At the least, a grade of zero will be assigned to any work that is the product of cheating or plagiarism.

Plagiarism is the use of the creations, ideas or words of someone else without formally acknowledging the author or source through appropriate use of

quotation marks, references, and the like. Plagiarizing is stealing someone's work and presenting it as one's own original work or thought. Student work in which plagiarism occurs will not ordinarily be accepted as satisfactory by the instructor, and may lead to disciplinary action against the student submitting it. Any student who is uncertain whether his or her use of the work of others constitutes plagiarism should consult the course instructor for guidance before formally submitting the course work involved.

Work that is assigned to you alone is to be assisted by no one else. When collaboration on homework is permitted, that fact will be made explicit. Assume that all assignments are to be individual work unless we indicate otherwise. *It is your responsibility to clarify with us any uncertainty that may exist on this matter. Do not assume that an action is acceptable; ask us to be sure.*

Work turned in for this course may be subject to electronic checking for plagiarism.

Honor code: All students should comply with the Honor Code. For all the exams, quizzes and assessments the cover sheet should include the signed Honor Code*:* ***"I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."***

Use of E-Mail:

You will be required to use e-mail as part of this course. Since our personal contact hours are quite limited, this will be a major avenue for our communication. In addition, we will use the class e-mail list and web page as means of broadcasting information to the class. It is assumed that class members are reading their e-mail on a daily basis. You may, of course, read your e-mail anywhere of your choosing, but it is required that you will have an active account of the form **XXX@agu.edu.tr** that you check or forward daily.

Re-grades:

Administrative details:

- A request for a re-grade must be submitted within one week of the date that the solutions are posted or a graded assignment (quiz, exam, etc.) is returned to you.
- You may request a regrade only once per exam or assignment.
- To avoid confusion, please submit a brief written regrade request that explain the rationale for the regrade.

Grounds for re-grades:

- Arithmetic errors (in adding up scores) or multiple choice grading mistakes.
- Requests for increase of partial credit are discouraged.

Make-ups / schedule conflicts:

- There will be no make-up quizzes.
- Midterms (Absence must be supported by a note from a doctor)
- If you are aware of a legitimate schedule conflict in advance, you must

request an alternate quiz or exam time and date from the instructor.
- In general, this will be before the class takes the quiz or exam, i.e. the person receiving special treatment will not have the advantage of additional time to study.

Some notes on how to study:

The biggest challenge you will face in this, and any other courses at AGU, is to develop an efficient study methods.

- *Read before, read after:* Skim the chapter before it is covered in lecture; this will help familiarize you with some of the terms associated with each topic. Review each chapter after it is covered in class; this will help you become familiar with the book and make it easier to review before exams.
- *Participate during class:* Take notes during class and look over them afterwards. Don't skip class. Ask questions.
- *Do the work:* Do the assigned problems as close to the time as when the topic is covered in the class, even when they are not graded; they are designed to help you to increase the depth of your understanding of specific concepts and to give you practice in problem solving. This will also shorten the time you take to solve problems and time is limited during exams.
- *Do not wait until the night before the exam to study:* This approach does not work.
- *Find a group of students to study with:* Seek out students dedicated to doing well in the course. These students can be found in drop-in tutoring sessions, or in the library studying. This group will help you stay focused and may assist you when things get confusing. Furthermore, explaining difficult concepts to others is an efficient way to learn yourself.
- *Stay focused:* Find an environment on campus with few distractions to work on the course material. Your dorm bedroom is not this space.

Week	Topic	Instructor Name
1	**Energy from Combustion** • Fossil Fuels and Electricity • Efficiency of Energy Transformation • The Chemistry of Coal • Petroleum • Measuring Energy Changes • Energy Changes at the Molecular Level • The Chemistry of Gasoline	Hakan Usta
2	**Energy from Electron Transfer and the bright future of energy** • Batteries, Galvanic Cells, and Electrons • Battery Ingredients: Cradle-to-Cradle • Hybrid Vehicles • Fuel Cells: The Basics • Hydrogen for Fuel Cell Vehicles • Photovoltaic Cells: The Basics • Electricity from Renewable (Sustainable) Sources	
3	**Chemistry for a Sustainable Future** • Neutralizing the Threat of Acid Rain • What is an Acid? • What is a Base? • Neutralization: Bases are Antacids • Introducing pH • Sulfur Dioxide and the Combustion of Coal • Nitrogen Oxides and the Combustion of Gasoline	
4	**The World of Polymers and Plastics** • Polymers: Long, Long Chains • Adding Up the Monomers • Polyamides: Natural and Nylon • Recycling: The Big Picture	
5	**Manipulating Molecules and Designing Drugs** • A Classic Wonder Drug • The Study of Carbon-Containing • How Aspirin Works: Function Follows Form • Modern Drug Design • Prescription, Generic, and Overthe Counter Medicines • Herbal Medicine	
6	**Electric Forces and Fields**	

	• Electric forces • Electric Forces and Coulomb's Law • Electric Field • Examples of Electric Field Lines	
7	**Conductors** • Insulators • Liquids and Gases • Polarization • Charging by Contact • Charging by Induction • Capacitor	
8	**Electric Potential** • Electric Potential Energy • Potential Energy – Two Point Charges • Superposition • Electric Potential: Voltage • Accelerating Charged Particles	
9	**Electric Field Near a Metal** • Lightning Rod • Equipotential Surfaces • Capacitors • Lightning • Dielectric Breakdown • Biological Applications	
10	**Electric Currents and Circuits** • Electric Currents • Current and potential energy • Current and Voltage • Electromotive force (emf) • Simple Circuits • Ohms Law • Resistivity	Murat Durandurdu
11	**Magnetic Fields and Forces** • Magnetism • Magnets • Magnetic Fields • Right-Hand Rule • Magnetic Fields of Moving Charges • Magnetic Field and Current Loop • Magnetic Forces & Bar Magnets • Force on Moving Charge • Motion of a Charged Particle • Magnetic Force on a Current • Torque on a Current Loop • Ampère's Law • Earth's Magnetic Field	
12	**Magnetic Induction**	

	• Electromagnetism • Faraday's Experiment • Magnetic Flux • Faraday's Law • Lenz's Law • Flux Though a Changing Area • Conservation of Energy • Electrical Generator • Inductance • Mutual Inductance	
13	**The Structure and Function of Large Biological Molecules**	Yusuf Baran
14	**Membrane Structure and Function**	
15	**Project Presentations**	