

CHEMISTRY 333
Analytical Analysis
Fall 2010 9847

- Instructor:* Dr. Alena Kubátová *Phone :* 777-0348
E-mail: akubatova@chem.und.edu
Lecture: M,W,F 10:00 – 10:50 am, Abbott Hall 138
Labs: Abbott Hall 218/215
Office Hours: W 11:00 – 12:00 pm or other times by arrangements.
Office: Abbott Hall 301
Teaching Assistants: Jana Št'ávoová, Manik Chintapalli
- Required Materials:* **Quantitative Chemical Analysis textbook 7th or 8th editions**
By Daniel C. Harris
ISBN: 1-4292-1815-0 ISBN-13: 978-1-429-21815-3
http://bcs.whfreeman.com/qca8e/default.asp#t_600368
RF Turning Point Clicker
Calculator (capable of exponential function) will be required for lecture, assignments and exams.
- Materials for Chem 333L:* **Laboratory Exercise Chemistry 333, 2010 edition**
A. Kubatova, University of North Dakota
Safety goggles, paper towels, calculator, laboratory notebook (detailed specifications are provided in the laboratory manual)
- Blackboard Website:* www.online.und.edu
- Attendance:* Lecture attendance is not mandatory. However, students are responsible for learning material, attending *unannounced* quizzes and credit boosters, and discovering if any announcements are made. The laboratory (Chem 333L is co-requisite and unless you have made special arrangement you need to register for it. The lab attendance is mandatory. **Use of the blackboard and clickers is necessary for the successful accomplishment of the class!!!**
- Approved Absences:* If you miss an exam due to a personal or family emergency please contact me (with valid proof) **immediately** upon your return to campus. If you know in advance about an event, that would be in conflict with the exam, contact me **at least** a week prior so that alternate arrangements can be made. However, if the reasons for absence are not sound enough or I am not informed in time the alternate exams will not be given.
- Disability Accommodations:* If you have emergency medical information to share with instructor, need special arrangements in case the building must be evacuated, or you need disability accommodations in this course, please make an appointment with the instructor. If you plan to request disability accommodations, you are expected to register with Disability Services for Students (DSS), 190 McCannel Hall, 777-3425 and let the instructor

see DSS Verification of Need for Disability Accommodations document. Contact information is at the top of the page.

Academic integrity: Students are expected to display academic honesty as defined in the code of Student Life and the Dictionary of Academic Integrity. Academic dishonesty will result in failing the course.

Grading: **The grading of lectures and labs is separate!** For lab grading check the lab manual textbook. In the lecture section students will be graded based on exams (68% of grade), on-line blackboard quizzes (20% of grade), unannounced clicker questions (10%). The total possible points obtained by clickers is expected to be approximately 130, seventy of those points will be necessary to acquire full score in class, additional points will be considered as extra **points**.

The following approximate point- scale will apply:

Exams (3)	300 points (100 each)
Final	150 points
Clicker quizzes	70 points
On-line quizzes	<u>130 points</u>
	650 points

Exams: Three mid-semester exams will be given on selected Tuesday from 12:00– 1:50 PM. Dates and content for the exams are given in the schedule. If you have conflict schedules in Tuesday noon please discuss it with me individually. A final exam will be given on Dec. 13, 10:15AM

A 3" x 5" note card of information may be used during examinations. Both sides of the card may be used but it must be handwritten and no magnification may be used.

Online Quizzes Seven Blackboard (Bb) quizzes are assigned in addition to the three "hour exams" and the final exam. The Bb quizzes are accessible online, and they must be completed by the indicated date (a total of two attempts are allowed. There is no time limit on each attempt). Failure to complete a quiz on time will result in a score of "zero." The quizzes can be completed in the computer lab in Chemistry department. Note the instructor can view exact number of attempts.

Letter Grades: A ($\geq 90\%$), B (89-80%), C (79-70%), D (69-55%), F (<55%)

Goal:

The goal of Chemistry 333 is to introduce the student to modern quantitative and qualitative analytical chemistry. An understanding of analytical chemistry is essential for those who wish to work in areas that are critically important in today's society. For example, clinical, forensic, and environmental laboratories could not function without the proper implementation of the many techniques, methods, and concepts that will be presented during this course. In addition to the lecture portion of this class, Chemistry 333 students will also perform laboratory experiments that will allow them to implement many of the methods and techniques described. These laboratory experiments are available on the UND Blackboard website for this course. Additional safety and procedural information will be given during these laboratory sessions.

Student's approach:

The exam questions will involve problem solving; simple scanning of the learning material won't help in the preparation at all. Every student in Chemistry 333 is **strongly** encouraged to use **ALL** of the learning resources that will be made available.

- **Attendance** with extra credit question helps not only your score, but also understand the topic and prepare for exams.
- **The lecture notes** are provided so the student has time to listen to lecture and **make additional explanatory notes**. Lecture notes should ease the work of student, but are **NOT self-explanatory**.
- Solving **all assigned problem sets and quizzes helps to develop problem solving ability**. Much of this course is built around solving chemical "word problems". Practice in solving these problems will be crucial to your success!! "Short-cuts" are dangerous.
- The **textbook** gives good overview of material covered. Along with lecture student will get supplemental material in the form of homework. The homeworks are not required. However, practicing and solving of those problems will ensure **successful** accomplishment of the class.
- Do not hesitate to **ask questions** and **for help** if you are having trouble. If you don't ask, nobody can help you. Don't be afraid to ask, there are no too simple questions. To make sure you get help, please make an appointment.
- Although asking questions is very important, it is also important to **study on your own**. The ability to achieve university degree corresponds to **the ability to study and think independently**. Therefore, students are expected to try to understand the topic on their own and go through learning material prior to the appointment.

TENTATIVE SYLLABUS

Week	No.	DATE	Lecture	Online Quizzes	LAB
1	1	08/25	Introduction – familiarization with structure of class, Analytical terminology - qualitative, quantitative, (Ch. 0)Units		No LABs
	2	08/27	Measurements tools (Ch. 1 & 2)		
2	3	08/30	Measurements tools (Ch. 1 & 2)		Lab check in
	4	09/01	Measurements tools (Ch. 1 & 2)		
	5	09/03	Statistics – accuracy, precision, error, deviation, significant digits, t-test, outliers, confidence int., P value (Ch.1, 3,4 &5)	Quiz 1 DUE Midnight 09/03	
3		09/06	No class - Labor Day holiday		No LABs
	6	09/08	Statistics continued (Ch.1, 3,4 &5)		
	7	09/10	Statistics continued (Ch.1, 3,4 &5)	Quiz 2 DUE Midnight 09/12	
4	8	09/13	Chemical equilibrium Review general chemistry & constants K, K_{sp} , K_a , K_b , K_w , pH, solubility, neutralization, pK_a , buffers (Ch. 6)		Exercise I Statistics
	9	09/15	Chemical equilibrium continued (Ch.6)		
	10	09/17	Titration & acid-base equilibrium , indicators (Ch.8, 9,10)	Quiz 3 DUE Midnight 09/19	
5	11	09/20	Titration continued (Ch.8, 9,10)		Exercise IIA Indicator titration
		09/21	Exam I Measurement tools, Statistics, Chemical equilibrium		
	12	09/22	Electrochemistry fundamentals – Oxidation/reduction - Nernst equation (Ch.13)		
	13	09/24	Electrochemistry & electrodes – Nernst equation, potentials, pH electrode, potentials (Ch.13,14)		
6	14	09/27	Electrochemistry – Instrumental methods (Ch.15,16)		Exercise IIB Potentiometric titration
	15	09/29	Electrochemistry – Instrumental methods continued (Ch.15,16)		
	16	10/01	Electrochemistry continued	Quiz 4 DUE Midnight 10/03	

Week	No.	DATE	Lecture	Online Quizzes	LAB
7	17	10/04	Spectrophotometry – general principles – molecular, absorption/emission AAS, AES, instruments (Ch. 17-20)		Exercise III pH determination
	18	10/06	Spectrophotometry continued (Ch. 17-20)		
	19	10/08	Spectrophotometry continued (Ch. 17-20)		
8	20	10/11	Spectrophotometry continued (Ch. 17-20)		Exercise IV Fluoride Analysis
		10/12	Exam II Titration & Electrochemistry		
	21	10/13	Spectrophotometry continued (Ch. 17-20)		
	22	10/15	Chromatography – General principles – separation, quantification (Ch. 22)	Quiz 5 DUE Midnight 10/17	
9	23	10/18	Gas Chromatography – injectors, columns, detectors (Ch. 23)		Exercise V Spectrophotometry
	24	10/20	Liquid Chromatography – HPLC, IC (Ch. 24)		
	25	10/22	Chromatography continued (Ch. 22-25)		
10	26	10/25	Chromatography continued (Ch. 22-25)		Exercise IV GC task I
	27	10/27	Sample Preparation (Ch. 23, 27)		
	28	10/29	Sample Preparation continued (Ch. 23, 27)	Quiz 6 DUE Midnight 10/31	
11	29	11/01	Mass Spectrometry (MS) ionization, analyzer (Ch. 21)		Exercise IV GC task I
	30	11/03	MS – instrumentation (Ch. 21)		
	31	11/05	MS – interpretation (Ch. 21)		
12	32	11/08	Applications		Exercise IV GC task II
	33	11/10	Applications	Quiz 7 DUE Midnight 11/10	
	34	11/12	Applications		
13	35	11/15	Applications		Exercise IV GC task II
		11/16	Exam III Spectrophotometry, Chromatography, MS		
	36	11/17	Applications		
	37	11/19	Applications		

Week	No.	DATE	Lecture	Online Quizzes	LAB
14	38	11/22	Applications		Exercise VII GC/MS
	39	11/24	Applications		
		11/26	No class – Thanksgiving		
15	40	11/29	Applications		Locker cleanup & checkout
	41	12/01	Applications		
	42	12/03	Applications		
16	43	12/06	Applications		
	44	12/08	Applications		
		12/10	No class – Reading and Review Day		
		12/13	FINAL Exam – ACS comprehensive 10:15 AM AH138		