

CHEMISTRY 141 COLLEGE CHEMISTRY I AUTUMN 2009

Lead Instructor

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Office Hours

MWF 8:10–9:00 AM and by appointment. I am frequently available outside of office hours. Please come in any time the door is open.

Electronic Reserve

This syllabus and keys for quizzes and midterm exams are posted on electronic reserve at the Mansfield Library: <http://eres.lib.umt.edu>. The course password is CHMY141.

Prerequisites

The ability to use algebra to solve “word problems” and analyze laboratory data. Whether or not you have taken and passed algebra courses, the prerequisite for this course is the ability to *use* algebra as a problem-solving tool. If your algebra skills are weak, you should consider putting off CHMY 141 until you get up to speed. You should be eligible to enroll in M 115 or higher satisfy the math prerequisite for this course. Additionally, if it has been some time since you took high school chemistry (≥ 3 yr), or if your high school chemistry course was not rigorous, or if you did not take high school chemistry, you should give serious consideration to taking CHMY 104 before you take CHMY 141 (see discussion of CHMY104 below).

Course Purpose and Objectives

An introductory survey of chemistry. We follow the standard curriculum in the United States, as suggested by the American Chemical Society. This is the first semester of a two-semester sequence. The sequence provides an introduction to the principles of physical and inorganic chemistry appropriate for the level of knowledge necessary for students who plan on majoring in medicine, health, engineering, or the sciences. A major theme of the course is to introduce you to the chemist’s view of the universe, with an emphasis on making connections between the macroscopic and the particulate levels of matter. Students taking CHMY 141 generally have majors that require two years or more of chemistry. CHMY 221–223 is a two-semester sequence in organic chemistry that is typically taken after CHMY 141–143, and thus concepts from organic chemistry are only touched upon lightly in the course.

The teaching staff has two overarching goals with respect to your intellectual development:

- 1. Development of your thinking skills.** In other words, we will work to help you with the development of your ability to think, specifically with respect to those thinking patterns commonly used by scientists. Chemists often use skills such as mathematical pattern recognition, the development and manipulation of mental models of particulate-level phenomena, and proportional, probabilistic, combinatorial, and correlational thinking. As mentioned in the prerequisite section, please note that fundamental algebraic skills are assumed to already be in place in this course. Our job is to help you link algebra and general chemistry.
- 2. Development of your content knowledge.** This is knowledge of facts, models, laws, and other information associated with chemistry.

Required Materials

Cracolice, M.S., & Peters, E.I. (2009). *General Chemistry: An Inquiry Approach. 2009–2010 Edition*. Mason, OH: Cengage Learning. The course textbook (the authors do not receive payment for sales of this textbook).

Cracolice, M. S. (2009). *Think Out Loud! The Active Lecture Supplement to General Chemistry: An Inquiry Approach. 2009 Edition*. Mason, OH: Cengage Learning. The lecture workbook (the author does not receive payment for sales of this supplement).

Gosser, D.K., Strozak, V.S., & Cracolice, M.S. (2006). *Peer-Led Team Learning General Chemistry (2nd Ed.)*. Pearson Prentice Hall. Written materials that serve as the foundation for the PLTL workshops (Professor Cracolice donates proceeds from sales of this textbook on this campus to a Montana non-profit charitable organization).

A nonprogrammable, single-line display scientific calculator. You may *not* use a programmable calculator or one that displays more than one line of information for exams and quizzes in this course.

A Molecular Model Set for General and Organic Chemistry. Most students need a model set to learn how to visualize molecules in three dimensions. Unless you have a talent for creating a mental three-dimensional image from a two-dimensional sketch, I strongly recommend the purchase of a ball-and-stick model set. It will not be needed until late in the semester, but the bookstore usually runs out early, and if you try to order one near the point in the semester at which we

need it, they typically cannot get it in on time. I recommend that you get one now. It also can be used next year in organic chemistry.

A spiral-bound college-lined (or grid-lined) paper notebook. Consistently doing the homework is the key to success in this course. An organized homework notebook will provide you with a mechanism to get feedback on homework-like quiz and exam questions. Bring your homework notebook with you to PLTL workshop and when you attend office hours.

Recommended

Eubanks, L.T., & Eubanks, I.D. *Preparing for Your ACS Examination in General Chemistry*. Examinations Institute, American Chemical Society. A study guide for the final examination.

Kean, E., & Middlecamp, C. (1986). *How to Survive and Even Excel in General Chemistry*. McGraw-Hill. A book that focuses on how to learn chemistry. An excellent supplement if you want to improve your study skills.

Any of the top selling general chemistry textbooks such as: Kotz, Treichel, & Townsend (Cengage), Brown, LeMay, & Bursten (Prentice Hall), Ebbing (Houghton Mifflin), Chang (McGraw-Hill), or Zumdahl (Cengage).
An alternative perspective on the same topic is often needed to cement your understanding of a concept.

Peters, E.I., & Scroggins, W.T. (1992). *Chemical Skills, 2nd edition*. McGraw-Hill. A supplementary book with a different perspective on the course material. A good source of additional practice problems, as well as a source of mathematical review. (This book is out of print, but you may be able to get a used copy, should you so desire.)

The course consists of three components: lecture, laboratory, and Peer-Led Team Learning workshop:

Lecture

MWF 2:10 PM–3:00 PM, ULH 101. Each lecture begins with a ten-minute quiz based on the homework assigned in the lecture immediately prior. The remainder of the period is used to introduce new material, generally using *Think Out Loud!* and working with your PLTL leader.

Laboratory

Sections 1–4	W	8:10 AM – 11:00 AM	CHEM 401
Sections 5–8	W	11:10 AM – 2:00 PM	CHEM 401
Sections 9–12	R	1:10 PM – 4:00 PM	CHEM 401
Sections 13–16	F	8:10 AM – 11:00 AM	CHEM 401
Sections 17–18	F	11:10 AM – 2:00 PM	CHEM 401
Sections 19–20	W	3:10 PM – 6:00 PM	CHEM 401

Details about the laboratory are covered in a separate syllabus. Prof. Valencich is the laboratory coordinator. You will meet your laboratory instructor at the first laboratory meeting.

Peer-Led Team Learning Workshop

Section 1	R	1:10 PM – 3:00 PM	CHEM 102	Section 11	T	1:10 PM – 3:00 PM	LA 338
Section 2	R	1:10 PM – 3:00 PM	NS 307	Section 12	T	1:10 PM – 3:00 PM	LA 249
Section 3	T	2:10 PM – 4:00 PM	LA 307	Section 13	T	5:10 PM – 7:00 PM	LA 303
Section 4	T	2:10 PM – 4:00 PM	LA 304	Section 14	T	5:10 PM – 7:00 PM	CHEM 102
Section 5	T	7:10 PM – 9:00 PM	CHEM 204	Section 15	R	2:10 PM – 4:00 PM	SS 340
Section 6	T	7:10 PM – 9:00 PM	CHEM 102	Section 16	R	2:10 PM – 4:00 PM	SB 336
Section 7	T	6:10 PM – 8:00 PM	LA 338	Section 17	W	11:10 AM – 1:00 PM	LA 335
Section 8	W	4:10 PM – 6:00 PM	CHEM 102	Section 18	W	11:10 AM – 1:00 PM	ED 214
Section 9	T	1:10 PM – 3:00 PM	CHEM 102	Section 19	T	1:10 PM – 3:00 PM	SS 340
Section 10	T	1:10 PM – 3:00 PM	CHEM 204	Section 20	R	2:10 PM – 4:00 PM	LA 202

Peer-Led Team Learning is a method of instruction that involves peers: undergraduate students who have done well in the course previously. It is designed to actively engage you in the process of learning chemistry. It also will develop your communication skills and ability to work in a team environment, both of which are viewed as essential by industrial employers.

Evaluation

Evaluation for the purpose of establishing a course grade is based on:

Midterm Examinations	40%	Final Examination	30%
Laboratory	14%	Quizzes	14%
PLTL Workshop	2%		

Midterm Examinations

Four midterm exams are given on the Thursday evenings specified in the calendar, 5:10 PM–6:55 PM. Each midterm exam is comprehensive, covering all material in the course to that date. Exams generally consist of twelve questions, with one question each from older material, laboratory, and workshop, and nine questions from the newer material. Students who have a conflict with the evening exam may take the exam 7:30 AM–9:15 AM on the morning of the exam date. To take the morning exam, submit a 3 × 5 card with the following information to me in lecture on the Wednesday one week before the exam: (a) name, (b) lab instructor, (c) workshop leader, (d) brief description of the nature of the conflict with the evening exam, and (e) name and phone number of person who can verify your conflict. If you qualify for the morning exam, you will receive a permission/conduct form with the location by Wednesday of the week of the exam.

Final Examination

The final examination is given on the date and time specified by the registrar, Monday 14 December, 1:10 PM–3:10 PM. The exam is a standardized exam developed by the American Chemical Society. It is a 70-item multiple-choice instrument. Your raw score on this exam is converted to your final exam score based on a conversion curve that I have established based on national norms. The final is mandatory; you will be assigned a grade of F for the course if you do not take the final exam, regardless of your point total prior to the exam.

Laboratory

The total number of laboratory points is multiplied by $[140/(\text{total lab points})]$ in the calculation of your final grade. The details of laboratory grading are outlined in a separate document.

Quizzes

Each lesson in *Think Out Loud!* ends with a reading and homework assignment from the textbook. The homework questions should be the focus of your study. At the *beginning* of each lecture, a ten-minute quiz will be administered with questions drawn from the textbook reading, programmed text examples, and/or homework questions. In general, when a lesson focuses on numerically-oriented concepts, the quiz question(s) will be a homework question with the compounds and/or numbers changed. When the lesson is more conceptually oriented, the quiz question(s) will be derived to test your grasp of the concepts from the reading. Each quiz is graded on a five-point scale. To allow for illness, emergencies, and other legitimate reasons to miss class, only the best 28 of 36 quizzes are used in the calculation of your final grade, for a total of 140 points.

PLTL Workshop

Each workshop is graded based on preparation, attendance, and participation. You will receive 2 points for completing the self-test, attending and participating, 1 point if you do not complete the self-test or do not make any significant contribution while attending, and no points if you do not complete the self-test and do not attend and participate in the entire workshop session. The best 10 workshop grades are used in the calculation of your final grade, for a total of 20 points.

Grading Distribution

The laboratory, homework, and workshop actually count for *much* more than the 30% that it may first appear. An actual percentage calculation is not possible because all course components are integrated, but keep in mind that every exam contains laboratory, homework, and workshop questions.

Grading Philosophy

An A student is someone who can solve homework-like problems under exam conditions with near-100% accuracy, who conceptually understands laboratory and workshop and can demonstrate that understanding through the correct solution of application questions on exams, and who can successfully solve novel problems on exams.

A B student is someone who can solve homework-like problems under exam conditions with near-100% accuracy, who conceptually understands laboratory and workshop and can demonstrate that understanding through the correct solution of application questions on exams, but struggles with novel problems on exams.

A C student is someone who can solve most homework-like problems under exam conditions, who conceptually understands laboratory and workshop and can demonstrate that understanding through the correct solution of most application questions on exams, and has a demonstrable understanding of the major concepts of the course.

A D student earns a passing grade. Thus a demonstrated understanding of the major concepts of the course is required. This includes the ability to solve most homework-like problems on exams and quality work on laboratory reports and in workshop.

A student who cannot demonstrate an understanding of the major concepts of the course through their performance on exams, laboratory reports, and in workshop does not earn a passing grade.

Grading

4	Midterm Exams	@ 100 points =	400 points
1	Final Exam	@ 300 points =	300 points
1	Laboratory Score	@ 140 points =	140 points
28	Quizzes	@ 5 points =	140 points
10	Workshop Evaluations	@ 2 points =	20 points
Total			1000 points

	A 930–1000 points	A– 900–929 points
B+ 870–899 points	B 830–869 points	B– 800–829 points
C+ 770–799 points	C 730–769 points	C– 700–729 points
D+ 670–699 points	D 630–669 points	D– 600–629 points
(600 or more required for CR for those using CR/NCR option)	F 0–599 points	

Make-up Exams, Quizzes, Workshops

No make-ups are allowed. In a class of this size, there is no possible way to fairly design special make-up exams for individual students. Students who miss exams for legitimate emergencies or illnesses will be allowed to replace one midterm score with the final exam score. If circumstances are such that you have to miss two or more midterms, it is unlikely that you have been able to learn the major concepts of the course. See me about a medical withdrawal. Eight of the 36 quizzes and two of the 12 workshops are not used in the calculation of your course grade to account for special circumstances such as emergencies and illnesses.

Midterm Exam Grading Standards

Midterm exams are graded on a 100-point scale by a process I call “modified multiple choice.” The philosophy here is to establish a general pattern for grading that can be consistently and fairly applied to an exam that is scored by a number of graders. The typical grading criteria for an eight-point calculation question are:

8 points	Solution clearly and correctly shown, correct answer and sig figs
4 points	Solution clearly shown but with one error
0 points	Two or more errors in the solution

Additionally, one point is subtracted for any of the following: (a) significant figures error, (b) calculational error, (c) not showing unit cancellation or omitting units. Questions worth 4 points or less are generally graded 4 = correct, 0 = one error or more, with the additional subtractions above on otherwise correct clearly-shown solution setups.

Not all questions will fit this pattern. Nonetheless, you hopefully can understand the general philosophy from this example. 50% or more of the possible credit is reserved for solutions that clearly show a correct understanding of the answer. 50% of the credit is awarded to answers that have one error in the solution process. No credit is given for answers with no work, a difficult-to-follow solution, or those with two or more errors. Errors include “dumb mistakes” as well as not-dumb mistakes, whatever those are. We treat missing a 10 mm = 1 cm conversion factor equally with missing any other conversion factor. Learn the fundamentals well!

Midterm Grading Errors

When midterm exams are returned, please check your exam for grading errors promptly. The answer key is posted the day following the exam at the course electronic reserve website. Barring emergencies, exams are returned by the Monday following the exam. If you believe that a grading error has occurred:

(a) On a piece of lined notebook paper or using a word processing program, divide the paper into two columns. In the left column, write the correct solution to the question, using no more than one line per step. In the right column, rewrite your solution, matching each step in the correct solution. Annotate your solution with an explanation of your error. In general, for six- or eight-point questions, one error should be awarded half credit, and two or more errors are awarded no credit. Any error on a 4-point question should be scored zero. One point is also subtracted for calculational or significant figure errors, or not showing units and/or unit cancellation.

(b) Attach the page to the front of your unaltered exam. Suspected grading errors must be submitted to me in class no later than one week after your graded exam is returned (so that the grader can recall grading criteria). Your regrade request will be returned to the original grader, who will explain why their original assessment was correct or s/he will adjust your grade if an error did occur. Graders are allowed to adjust your grade up or down or make no adjustment.

Change in Perspective from High School to College

If you consider both your probable lack of college-level study skills (simply due to lack of experience) and the difficulty level of the course material, you will most likely find this to be the most challenging course you will experience in

college. Advanced courses are more difficult, of course, but you will develop skills as you mature as a student that will put you in a better position to deal with the more advanced courses. The standard formula for out-of-class time for college courses schedules two hours out of class for each hour in class for an average student. Given that you spend 8 hours per week in class, as a minimum, you should schedule 16 hours per week of study time. If you wish to earn an A or a B in this course, you should schedule 20–25 hours per week or more outside of class. The exact number of hours largely depends on your previous preparation and innate intelligence; only you can judge. The distribution of your time is also important. You will maximize the probability of learning the course material well and therefore being rewarded with a good grade by studying two to four hours each day, everyday, rather than cramming all 24 hours per week of study time into a couple of days.

CHMY 104: Preparation for Chemistry

Although not a required prerequisite for the course, CHMY 104 is specifically designed to prepare students for CHMY 141. If you did not pass the diagnostic exam, you should start in CHMY 104. If you marginally passed the placement exam, you probably should start in CHMY 104. If your algebra skills are weak, you should start with the appropriate math course(s) and then take CHMY 104 before CHMY 141. CHMY 141 is offered in the Spring Semester, and CHMY 162 is offered in the Summer Semester, putting you back on track for CHMY 221 in the subsequent Autumn Semester.

Dropping the Course and Changing Grade Option

Monday 21 September is the last day to drop by CyberBear (4:30 PM). Dropping on or before this date results in NO RECORD of taking this course on your transcript. This is also the last date to change your grade option to AUDIT.

Monday 2 November is the last day to drop with the signatures of your advisor and the course instructor. Dropping between 22 September and 2 November results in a grade of W on your transcript.

After 2 November, you have made the decision to stay in the course until the end. After this date, you must have documented justification of a circumstance beyond your control to drop the course. In addition to the written external proof of your claim, you have to acquire the signature of your advisor, course instructor, and dean of your major. Here are the guidelines on what the CAS Dean's office regards as appropriate verification:

1. Medical. *Memo from physician or other medial professional.*
2. Change in work schedule. *Memo from employer with pertinent information.*
3. Family/personal emergency. *Memo from appropriate professional.*

If this is the case, submit your completed drop petition *and a copy of the documentation* to me immediately before or after class. If you have less than 50% of the possible exam points on that date, you will be assigned a WF grade; if you have more than 50% of the exam points to date, you will be assigned a WP grade.

Any time during the semester up to 11 December (the last day of classes before finals week), you may change your grading option between traditional and credit/no credit (by petition). (The audit option cannot be selected after 21 September.) Your choices are:

1. Traditional letter grade. Details are given elsewhere in this syllabus.
2. Credit/No Credit grading. A freshman or sophomore with a GPA of 2.00 or better may elect one undergraduate course a semester on a credit/no credit basis. Juniors and seniors may elect more than one credit/no credit course a semester. No more than 18 CR credits may be counted toward graduation. *If you choose the CR/NCR option in this course, it will not count toward General Education Requirements.* The credit/no credit option does not extend to courses required for the student's major or minor, except at the discretion of the department concerned. CR and NCR grades do not affect grade point average. The University cautions students that many graduate and professional schools and some employers does not recognize non-traditional grades or may discriminate against students who use the credit/no credit option for many courses. Additionally, the option is often problematic for students who transfer to another institution.

Why do Biology Majors and Health Professions Majors Need 2+ Years of Chemistry?

The general course objectives can be summarized in one phrase: to introduce you to the way chemists study the universe. All health science and biology curricula require, to some degree, an understanding of chemistry, and this is because the separation between chemistry and biology is rapidly being eliminated. The critical component of the chemist's approach to studying the universe is the consideration of the particulate nature of matter. The cell, the old standard for the basic unit in biology, has now been replaced with a more fundamental basic unit, the molecule. In this course, we introduce you to this building block of all living (and nonliving) things.

Disabilities

Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Legal Notices

This course syllabus is *not a contract*; it is a tentative outline of course policies. Changes may be made before, during, or after the semester at my discretion.

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the university. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php.

Frequently Asked Questions

All I did was put 10 centimeters = 1 meter and I lost 50% of the points for a five-step problem. Is that correct?

Yes. "Stupid error" flaws and "smart error" (?) flaws are treated equally. It pays to know the fundamentals, and it costs not to know them. A patient who is administered a medication dosage that is "just" off by a factor of ten is a dead patient. A bridge that too weak to handle a weight load "just" off by a factor of ten is an engineering catastrophe.

I failed the first two exams, and now the drop date has past. Can I petition to drop because of my failing grade?

Make your drop decision by the drop date, 2 November. You cannot drop simply because you are failing the course. See the criteria for dropping past the deadline.

I study all of the time for this course, but I still can't do better than a C on the exams. How can I improve my grade?

The Kean and Middlecamp book has a number of suggestions on improving your study efficiency. I strongly suggest that you work through it in its entirety early in the semester and then review the most pertinent sections throughout the semester. They are the world's experts in the *process* of learning chemistry, and I can not provide you with better advice than theirs.

I failed the first exam. Should I drop the course?

The best predictor of your grade in this course after the first exam is your grade on the first exam. For example, *all* of the students who scored less than 50% on the first exam in Autumn 1996 failed the course. It doesn't get any easier than the first exam, and subsequent material depends on understanding the material on the first exam. If you choose to stay in the course, you need to make radical changes in your study habits. Keep in mind that not only will you have to find more time to study for this course, but you will also have to find additional time to make up for the deficiencies of the first few weeks. It's your decision, but recognize that you need to do something different if you want to succeed.

But I'm a special case because I'm _____. I need to take the exam on _____.

I can not write a separate make-up exam for each student with special circumstances. It takes me one whole day to write an exam. Even if I had an "extra" day to write an exam just for you, it wouldn't be fair because it would not be at an equivalent difficulty level. You can take the exam when it is scheduled, early by permission, or you cannot take it.

Why won't you consider my special circumstances?

The primary criterion that I use to guide my decisions in the course is *fairness*. If I do a special favor for one student, I will do it for all students. If I can't do it for all students, I won't do it for one.

I'm not doing too well in this course, so I want to take an incomplete now and finish the course next semester, OK?

No. The only circumstances that a grade of "incomplete" is assigned is for students who are passing the course but have a documented reason for missing the final such as serious illness, etc.

I'm not a whiner, but I study more for this course than I have for any other course in my whole life and I'm still getting a B. What can I do to bring my grade up to an A?

This is a tough question, as the answer may lie in a number of different areas. First and foremost, you probably need to spend more time studying. Research shows that you initially make great gains in learning with very little studying, but then the gains become smaller and smaller per unit time as the work continues. In other words, you may need to study 15 hours a week outside of class to get a C, 20 hours to get a B, but 30 hours to get an A. The C-to-B gap is smaller than the B-to-A gap. Have your workshop leader set you up with an A student, and talk with that person about their study behavior.

Someone told me to study smarter, not harder. How can I study smarter?

As Thomas Edison said, "Genius is one percent inspiration and ninety-nine percent perspiration." You can improve the most by studying harder. Many people don't want to accept the fact that it takes work, sacrifice, and self-discipline to get good grades, so they look for some miracle system. However, many students can "study smarter" simply by scheduling 3 hours a day, everyday, alone and distraction-free, for this course.

How do I prepare for the exams?

Learn the fundamentals, and learn them well. In a classic psychology experiment, a bird was trained, in separate episodes, to do each of the following tasks: open a door in its cage, drag a box across its cage, stand on the box, and peck at a target. When the target was hung from the top of the cage and the box was placed behind the closed door, the bird figured out all by itself how to open the door, drag the box across the cage, stand on the box, and peck the target. Hopefully you are a bit more intelligent than a birdbrain (ugh, bad pun) and can do the same with chemistry knowledge. Consider the opposite situation. If you don't know the fundamentals, you have no opportunity to assemble them to solve a problem. Always include a review of the laboratory and workshop in your exam preparation routine.

Even though I earned a D according to the number of points I have, I deserve a C because of the circumstances of my life. Will you reconsider my grade?

No. I understand that some of you have jobs and are single parents, etc., and I commend you for taking this course under those circumstances, but your grade in this class is solely based on your performance on the evaluative instruments.

A BRIEF PRIMER ON DELIBERATE PRACTICE

by Geoffrey Colvin

The best people in any field are those who devote the most hours to what the researchers call "deliberate practice." It's activity that's explicitly intended to improve performance, that reaches for objectives just beyond one's level of competence, provides feedback on results and involves high levels of repetition.

For example: Simply hitting a bucket of balls is not deliberate practice, which is why most golfers don't get better. Hitting an eight-iron 300 times with a goal of leaving the ball within 20 feet of the pin 80 percent of the time, continually observing results and making appropriate adjustments, and doing that for hours every day - that's deliberate practice.

Consistency is crucial. As Ericsson notes, "Elite performers in many diverse domains have been found to practice, on the average, roughly the same amount every day, including weekends."

Evidence crosses a remarkable range of fields. In a study of 20-year-old violinists by Ericsson and colleagues, the best group (judged by conservatory teachers) averaged 10,000 hours of deliberate practice over their lives; the next-best averaged 7,500 hours; and the next, 5,000. It's the same story in surgery, insurance sales, and virtually every sport. More deliberate practice equals better performance. Tons of it equals great performance.

All this scholarly research is simply evidence for what great performers have been showing us for years. To take a handful of examples: Winston Churchill, one of the 20th century's greatest orators, practiced his speeches compulsively. Vladimir Horowitz supposedly said, "If I don't practice for a day, I know it. If I don't practice for two days, my wife knows it. If I don't practice for three days, the world knows it." He was certainly a demon practitioner, but the same quote has been attributed to world-class musicians like Ignace Paderewski and Luciano Pavarotti.

Many great athletes are legendary for the brutal discipline of their practice routines. In basketball, Michael Jordan practiced intensely beyond the already punishing team practices. (Had Jordan possessed some mammoth natural gift specifically for basketball, it seems unlikely he'd have been cut from his high school team.)

For most people, work is hard enough without pushing even harder. Those extra steps are so difficult and painful they almost never get done. That's the way it must be. If great performance were easy, it wouldn't be rare. Which leads to possibly the deepest question about greatness. While experts understand an enormous amount about the behavior that produces great performance, they understand very little about where that behavior comes from.

The authors of one study conclude, "We still do not know which factors encourage individuals to engage in deliberate practice." Or as University of Michigan business school professor Noel Tichy puts it after 30 years of working with managers, "Some people are much more motivated than others, and that's the existential question I cannot answer—"why."

The critical reality is that we are not hostage to some naturally granted level of talent. We can make ourselves what we will. Strangely, that idea is not popular. People hate abandoning the notion that they would coast to fame and riches if they found their talent. But that view is tragically constraining, because when they hit life's inevitable bumps in the road, they conclude that they just aren't gifted and give up.

Maybe we can't expect most people to achieve greatness. It's just too demanding. But the striking, liberating news is that greatness isn't reserved for a preordained few. It is available to you and to everyone.

GRADE SUMMARY

Name: _____ ID: _____

Section: _____ Lab Instructor/Workshop Leader: _____

E1	E2	E3	E4		Exam Total 400 possible
Q01	Q02	Q03	Q04	Q05	
Q06	Q07	Q08	Q09	Q10	
Q11	Q12	Q13	Q14	Q22	
Q23	Q24	Q25	Q26	Q19	
Q20	Q21	Q27	Q28	Q29	
Q30	Q31	Q32	Q33	Q34	
Q35	Q15	Q16	Q17	Q18	
Q37	Q38				Quiz Total 140 possible
W01	W02	WNom	W03	W04	
W06	W07	W08	W09	W10	
W11	W05				Workshop total 20 possible
_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	

Laboratory raw total: _____ × (140/raw total) =

Laboratory Total
140 possible

Extra Credit

Final exam percentage: _____ × 3 =

Final
300 possible

Course Grade: _____

TOTAL (1000 possible)

POINT-BY-POINT COMPARISON BETWEEN HIGH SCHOOL AND COLLEGE <i>by Pat Feldman and Vicki Hill of Southern Methodist University's Altschuler Learning Enhancement Center</i>	
PERSONAL FREEDOM IN HIGH SCHOOL VS. PERSONAL FREEDOM IN COLLEGE	
High school is mandatory and free (unless you choose other options).	College is voluntary and expensive.
Your time is usually structured by others.	You manage your own time.
You need permission to participate in extracurricular activities.	You must decide whether to participate in extracurricular activities. (Hint: Choose wisely in the first semester and then add later.)
You need money for special purchases or events.	You need money to meet basic necessities.
You can count on parents and teachers to remind you of your responsibilities and to guide you in setting priorities.	Guiding principle: You're old enough to take responsibility for what you do and don't do, as well as for the consequences of your decisions.
HIGH SCHOOL TEACHERS VS. COLLEGE PROFESSORS	
Teachers check your completed homework.	Professors may not always check completed homework, but they will assume you can perform the same tasks on tests.
Teachers remind you of your incomplete work.	Professors may not remind you of incomplete work.
Teachers approach you if they believe you need assistance.	Professors are usually open and helpful, but most expect you to initiate contact if you need assistance.
Teachers are often available for conversation before, during, or after class.	Professors expect and want you to attend their scheduled office hours.
Teachers have been trained in teaching methods to assist in imparting knowledge to students.	Professors have been trained as experts in their particular areas of research.
Teachers present material to help you understand the material in the textbook.	Professors may not follow the textbook. Instead, to amplify the text, they may give illustrations, provide background information, or discuss research about the topic you are studying. Or, they may expect you to relate the classes to the textbook readings.
Teachers often write information on the board to be copied in your notes.	Professors may lecture nonstop, expecting you to identify the important points in your notes. When professors write on the board, it may be to amplify the lecture, not to summarize it. Good notes are a must.
Teachers impart knowledge and facts, sometimes drawing direct connections and leading you through the thinking process.	Professors expect you to think about and synthesize seemingly unrelated topics.
Teachers often take time to remind you of assignments and due dates.	Professors expect you to read, save, and consult the course syllabus (outline); the syllabus spells out exactly what is expected of you, when it is due, and how you will be graded.
TESTS IN HIGH SCHOOL VS. TESTS IN COLLEGE	
Testing is frequent and covers small amounts of material.	Testing is usually infrequent and may be cumulative, covering large amounts of material. You, not the professor, need to organize the material to prepare for the test. A particular course may have only 2 or 3 tests in a semester.
Makeup tests are often available.	Makeup tests are seldom an option; if they are, you need to request them.
Teachers frequently rearrange test dates to avoid conflict with school events.	Professors in different courses usually schedule tests without regard to the demands of other courses or outside activities.
Teachers frequently conduct review sessions, pointing out the most important concepts.	Professors rarely offer review sessions, and when they do, they expect you to be an active participant, one who comes prepared with questions.
Mastery is usually seen as the ability to reproduce what you were taught in the form in which it was presented to you, or to solve the kinds of problems you were shown how to solve.	Mastery is often seen as the ability to apply what you've learned to new situations or to solve new kinds of problems.
GRADES IN HIGH SCHOOL VS. GRADES IN COLLEGE	
Grades are given for most assigned work.	Grades may not be provided for all assigned work.
Consistently good homework grades may help raise your overall grade when test grades are low.	Grades on tests and major papers usually provide most of the course grade.
Initial test grades, especially when they are low, may not have an adverse effect on your final grade.	Watch out for your first tests. These are usually "wake-up calls" to let you know what is expected--but they also may account for a substantial part of your course grade. You may be shocked when you get your grades.
You may graduate as long as you have passed all required courses with a grade of D or higher.	You may graduate only if your average in classes meets the departmental standard--typically a 2.0 or C.
Guiding principle: "Effort counts." Courses are usually structured to reward a "good-faith effort."	Guiding principle: "Results count." Though "good-faith effort" is important in regard to the professor's willingness to help you achieve good results, it will not substitute for results in the grading process.