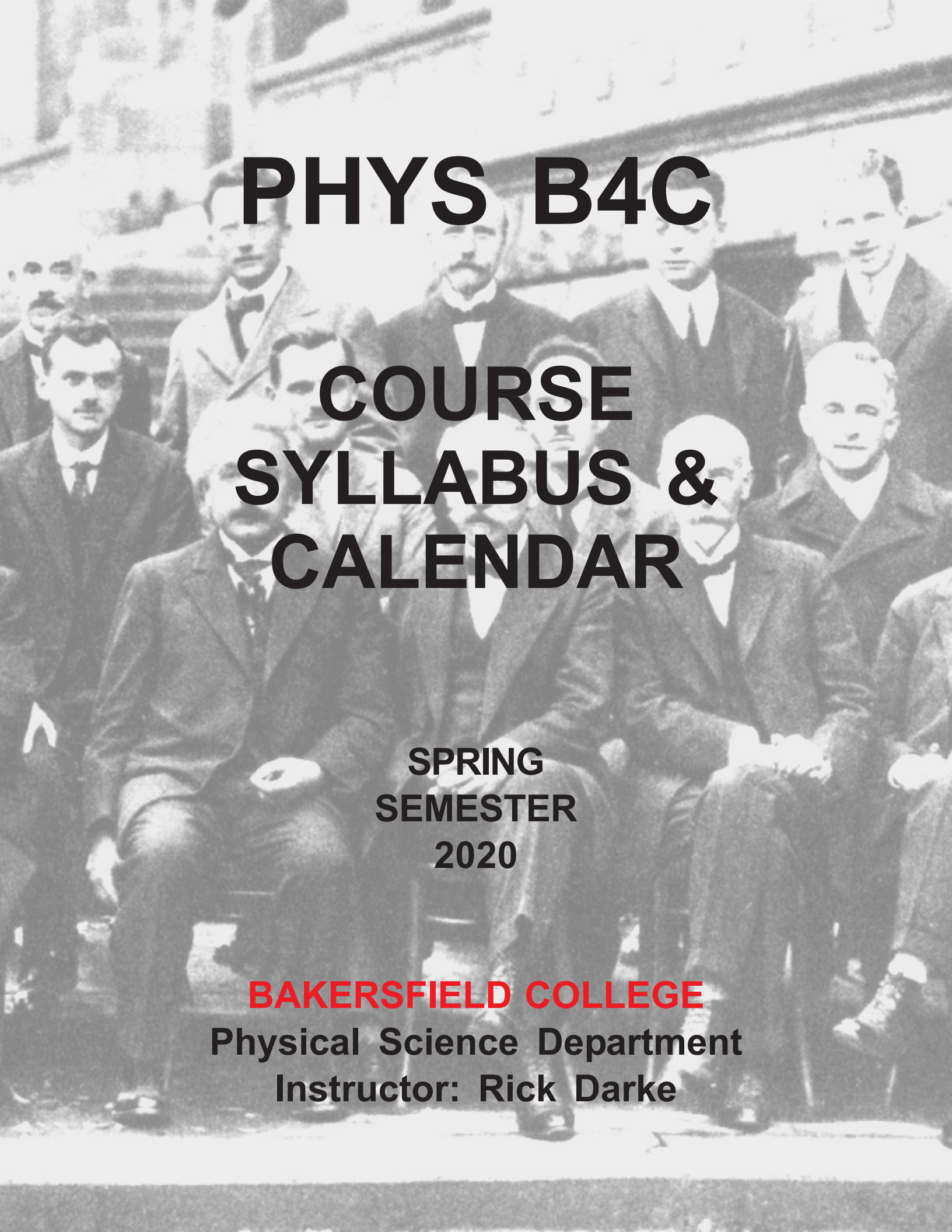


PHYS B4C

COURSE SYLLABUS & CALENDAR

SPRING SEMESTER 2020

BAKERSFIELD COLLEGE
Physical Science Department
Instructor: Rick Darke

INSTRUCTOR: Rick Darke

COURSE: PHYS B4C: Optics and Modern Physics (4 units). A pdf version of this syllabus and calendar can be downloaded from the website **www.rdarke.weebly.com.**

SCOPE: This course covers geometrical and physical optics, special relativity, quantum physics, atomic physics, and nuclear physics. Laws, principles, theories, and problem solving are emphasized.

APPLICABILITY: This course is the third in a 3-course calculus-based physics sequence required of physics, engineering, and many other science-based majors by four-year colleges and universities.

PREREQUISITES: Physics B4B (Heat, Electricity, and Magnetism). Note: Having completed Physics B4B, the student must have already taken Math B6B (Calculus II) or its equivalent. Math B6D (ordinary differential equations) is recommended, however, any applications of differential equations in the course (normally first encountered in quantum physics late in the semester) will not be assumed to be familiar material.

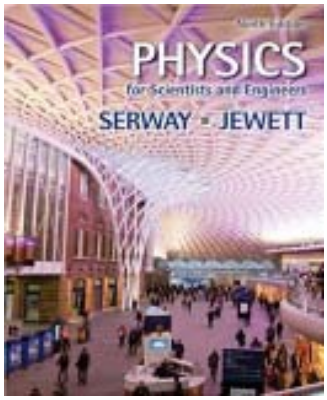
C-ID DESCRIPTOR: The Course Identification Numbering System (C-ID) is a supranumbering system developed to facilitate transfer and articulation in California's higher educational institutions. The C-ID descriptor for Physics B4C is PHYS 215 (Calculus-Based Physics for Scientists and Engineers: C). Visit www.c-id.net for a description.

WEEKLY SCHEDULE:

LECTURE	R Darke	TR	SE 53	8:00-9:25 am
LAB 01 (32450)	R Darke	T	SE 4	1:00-4:10 pm
LAB 02 (32451)	R Darke	R	SE 4	1:00-4:10 pm

OFFICE HOURS: I will hold office hours in SE 4 on Tuesdays and Thursdays from 12:30 to 1:00 pm. I can be contacted at **physicsatbc@aol.com.** In situations of some urgency, messages may be left at the Office of Instruction (SE 57: 395-4231).

TEXTBOOK: *Physics for Scientists and Engineers with Modern Physics* (Chapters 1-46), Serway and Jewett, Brooks/Cole, 9/e (2014). Students that took Physics B4B in the fall semester of 2019 should already have this text. If you are new to this calculus-based physics sequence, or did not take Physics B4B last fall, you will need to purchase WebAssign access to homework and the e-version of the text (see page 10 of this syllabus for details). Check with the BC bookstore about the availability of a hardcopy of this text if you do not have one and would like one in addition to the e-version.



IMPORTANT DATES: Note the following important dates during the Spring 2020 semester, most of which are shown on the accompanying course CALENDAR.

IMPORTANT SEMESTER DATES

Monday	1-20-20	MLK Jr Day holiday
Tuesday	1-21-20	Instruction begins
Friday	1-31-20	Last day for refunds
Sunday	2-02-20	Last day to add class
Sunday	2-02-20	Last day to drop class
Friday	2-14-20	Lincoln Day holiday
Monday	2-17-20	Washington Day holiday
Tuesday	2-25-20	Exam 1 (optics exam)
Friday	3-27-20	Last day to withdraw
Tuesday	3-31-20	Exam 2 (quantum exam)
Wednesday	4-01-20	Graduation filing deadline
4-06-19 to	4-10-20	Spring recess (no class)
Tuesday	4-28-20	Exam 3 (nuclear exam)
Friday	5-08-20	Last day of instruction
5-11-20 to	5-15-20	Final exams week
Thursday	5-14-20	Final exam (7:30-9:50)
Friday	5-15-20	Commencement

The following are the student learning outcomes (SLO's) adopted for the PHYS B4C course and on record in the course outline in CurricuNET. At the conclusion of this course the student should be able to:

- demonstrate the ability to employ the principles and conservation laws encountered in this physics course to solve conceptual problems in optics and modern physics. The student will demonstrate the ability to build on the principles and conservation laws encountered in previous physics courses in the sequence (Newtonian mechanics, thermodynamics, and electricity and magnetism) to solve conceptual problems.

- continue to perfect the critical reading skills that are necessary in assimilating the type of technical material encountered in a physics course in thermodynamics and electricity and magnetism. These reading skills are crucial in learning to apply physics principles to conceptual and quantitative problem solving and also to understand problem-solving methodology as is guided by sample problems within the textbook.

- develop an effective methodological approach to quantitative problem solving in physics. The student will show evidence of seeking and using "conceptual keys" (principles and conservation laws) to build upon in quantitative problem solving. The student will become skilled in the organization and documentation of work done in quantitative problem-solving exercises.

- perform a multifunction regression analysis on paired data and (1) fit the data with a regression equation, and (2) use the regression equation as a tool in making estimations, and (3) employ integral and differential calculus techniques in obtaining quantities related to regression equations. The student will be able to use the coefficient of determination from a regression analysis to evaluate the fit of the regression equation.

- become proficient in the type of problem solving typical in an introductory physics course in optics and modern physics. In this sense, "problem solving" is meant to include (1) the critical reading of the problem, (2) the recognition of principles involved in the problem, (3) the identification of the information given and the quantity requested, (4) the feasibility of a solution, (5) the identification of a group of relevant formulae essential to obtain a solution, and (6) the successful employment of mathematical operations used to obtain the solution.

- effectively employ the math skills and interpretive tools of some useful statistical methods as would be used in analyzing experimental data. This would include finding various "measures of central tendency" and other relevant parameters associated with data. The student will be able to correctly use/interpret such experimental quantities as uncertainties, units, measurement precision, and measurement accuracy.

- continue to perfect the laboratory skills of (1) being able to use laboratory apparatus properly, (2) following safe laboratory practices, (3) following written and verbal directions, (4) making measurements with appropriate precision, and (5) evaluating the accuracy of measurements. The student will also be able to configure laboratory apparatus used in optics and modern physics experiments given a schematic diagram to work with.

- effectively incorporate the mathematical tools of differential calculus, integral calculus, and vector calculus into quantitative problem solving in this course. The student will demonstrate the ability to use some techniques from differential equations (as embedded in this course) to deal with wave functions and Schrodinger's Equation as is encountered in quantum mechanics.

READING: The assigned reading in the textbook, as is specified on the accompanying course CALENDAR, should be done prior to the class meeting for which the corresponding lecture is slated. It is extremely important that you are exposed to material in the text before it is presented in lecture. This will make a significant difference in your level of understanding the subject.

PROBLEM SETS: You are expected to spend a considerable amount of time and energy working problems in any physics course. For each chapter covered in the text, a problem set consisting of 10 problems (5 problems for chapters not fully covered) is assigned. These problems are to be worked and submitted for grading through WebAssign. An orientation to WebAssign will be presented in the first laboratory meeting. If you do not already have one, you will need to set up a WebAssign account online. To set up your account, follow the directions shown on the WEBASSIGN page of this syllabus. Chapter problem submission deadlines are shown on this page, and also appear on the course CALENDAR in this syllabus.

UNIT EXAMS: Three (3) unit exams will be given during the term, the dates of which are specified on the accompanying course CALENDAR. Each of these exams will be worth either 75 or 50 points (depending upon the number of chapters covered). There will be no make-up exams given in this course unless the justification is sufficient and the instructor is notified before the exam. The difficulty level of make-up exams will be slightly higher than the regular exams since students taking them will have had a little more time to prepare for them than the other students. Material included on unit exams will span topics covered in lectures, in the text, in assigned problems, and in exercises done in class.

LABORATORY: The laboratory session in this course is a three-hour meeting held in SE 4 on Tuesdays 1:00-4:10 pm (32450), Thursdays 1:00-4:10 pm (32451), or Wednesdays 6:00-9:10 pm (32452). The activities covered in each of the labs are specified on the accompanying course CALENDAR. There is no required laboratory manual for this course. Handouts for each of the lab exercises will be distributed in lab before the pre-lab orientation. There will be twelve (12) 5-point laboratory assignments to be turned in for grading during the term, the lowest scored of which will be thrown out at the end of the semester (no make-ups). Note that some laboratory assignments are to be turned in at the end of the lab session, and some are to be turned in at the beginning of the following lab meeting. Labs turned in after they are due but before the beginning of the next lab session will incur a 2-point deduction. Labs cannot be turned in later than a week after they are due. No student who has missed more than 3 lab assignments by the end of the course will receive a passing grade in the course.

FINAL EXAM: A 150-point comprehensive final exam, which will contribute 30.0 percent to your course grade, will be given from 7:30 to 9:50 am on Thursday, May 14, 2020. All students must take the final exam to pass the course. A high standing in the class at the end of the course does not exempt a student from taking the final exam.

GRADING: An overall course point total between 0 and 500 will be computed from the following sources shown in the table below. Your overall course grade will be determined by the percentage scale shown in the table below. In order to get a rough idea of how you are doing at any time in the course, you can compute your current percentage and compare it with this scale. For this purpose, you might want to use the table to the right to keep a record of your scores.

SOURCES OF POINTS

Unit exams (3)	200 pts	40.0 %
Problem sets (10)	95 pts	19.0 %
Lab Exercises (11/12)	55 pts	11.0 %
Final exam (1)	150 pts	30.0 %
Total points	500 pts	100.0 %

PERCENTAGE GRADING SCALE

88 - 100 %	(440 - 500 pts)	A
76 - 88 %	(380 - 439 pts)	B
58 - 76 %	(290 - 379 pts)	C
50 - 58 %	(250 - 289 pts)	D
00 - 50 %	(000 - 249 pts)	F

SCORE RECORD

P 35	/ 10	Lab 1	/ 5
P 36	/ 10	Lab 2	/ 5
P 37	/ 10	Lab 3	/ 5
P 38	/ 10	Lab 4	/ 5
P 40	/ 10	Lab 5	/ 5
P 41	/ 10	Lab 6	/ 5
P 42	/ 10	Lab 7	/ 5
P 44	/ 10	Lab 8	/ 5
P 45	/ 5	Lab 9	/ 5
P 39	/ 10	Lab 10	/ 5
Unit exam 1	/ 75	Lab 11	/ 5
Unit exam 2	/ 75	Lab 12	/ 5
Unit exam 3	/ 50	Final exam	/ 150

ATTENDANCE: Although attendance is not figured directly into your grade, a few absences could seriously affect your performance in this course. Roll will normally be taken at the start of each class meeting. If you come in late to class, please inform the instructor at the end of the period that you were present. District policy directs instructors to drop students who have missed more than the equivalent of two weeks of class time during the regular semester (Bakersfield College 2019-2020 Catalog). In accordance with this, if you miss more than 12 hours of class time, you are "at risk" of being dropped from this course. Students are officially responsible for withdrawing from this or any other class in which they no longer wish to be enrolled. Non-attendance does not release the student from this responsibility. Strive for perfect attendance.

ACADEMIC HONESTY: The administration, faculty, and staff at Bakersfield College believe that students are entitled to the finest education that the college can make available to them. At the same time, however, a student's proficiency and achievement in course subject matter must include the realization that there are standards of academic honesty which should prevail in all one's endeavors. Any form of academic dishonesty in this course will not be tolerated and will be treated as student misconduct at Bakersfield College (Bakersfield College 2019-2020 Catalog) regarding academic honesty definitions and policy, and refer to the the Bakersfield College Student Handbook about the possible disciplinary consequences of student misconduct.

CALCULATOR: A calculator is a necessary instructional support item for this course. To be effective in supporting all of the computational tasks encountered in this course, your calculator should have all of the capabilities of a scientific calculator, plus the ability to perform multi-function regression analyses. Regression analysis is routinely done in the laboratory portion of the course, and a calculator that can perform linear, exponential, and parabolic regression analyses is necessary. If you do not have a calculator with these capabilities, you may use any of the Sharp EL-506 calculators that will be available in the lab.

DISABILITY POLICY: The Center for Student Success (CSS) assists the college in providing equal access to educational opportunities for students with disabilities. The center provides reasonable accommodations to students with documented physical, communication, psychological, developmental, and learning disabilities who are enrolled in classes through Bakersfield College. Students with disabilities who believe they may need accommodations in this course are encouraged to contact the Center for Student Success in CSS 10, 395-4334, as soon as possible to ensure such accommodations are implemented in a timely manner. See the Bakersfield College 2019-2020 Catalog to learn more about the function of Disabled Students Programs & Services (DSPS).

Note: The instructor reserves the right to make any changes in the course or calendar that are deemed appropriate. Such changes might involve minor realignments in covered topics, assignment content, assignment point values, or assignment due dates. Any changes would be made only if they are felt to be necessary in maintaining an effective level of instruction, learning, or evaluation.

LAB SAFETY: Safety in the laboratory is a primary concern in any lab-based physical science course. All students taking Physics B4C must be introduced to basic safety concerns as would be specific to this course and the lab work that is done in it. On your first lab meeting you will be given a safety orientation by the instructor in which the items listed below will be discussed in detail. Upon completion of this orientation, you will sign and date a copy similar to this one, and return it to the instructor to be kept in the department's records. You will keep this copy for your own records. Any student who has not signed a laboratory safety form will not be allowed to participate in any lab work in the course.

PHYSICS B4C LAB SAFETY

- No food, drinks, or smoking are allowed in the lab (note signs posted in the SE building prohibiting food and drink in the halls, classrooms, and labs). If you bring any food or drink with you into the lab, it must be in a sealed container and stowed away from the work area. You may leave on break for food or drink, but please do so outside the building.

- When performing experiments, all book-packs, purses, and personal belongings other than your lab manual, a notepad, a calculator, and writing instrument should be placed away from the work area and walkways in the physics lab (the alcove area or under the work benches are suitable locations). This will eliminate the hazard of having to work around such obstacles.

- Know where the following items are in and around your physics lab: (1) fire exits from the lab and the building; (2) fire extinguisher; (3) telephones (for emergency use only); (4) the Office of Instruction (SE 57); and (5) first aid kit.

- Report all injuries to the instructor, no matter how seemingly insignificant. Report all near-accidents or mishaps, as this information can allow us to take any necessary measures to minimize danger to students or equipment in the future. Report all equipment damage to your instructor or the physics stockroom technician.

- Laboratory experiments may not be performed if the instructor is not in attendance. Do not perform any experiments that are unauthorized or deviate from those prescribed.

- Do not enter the physics stockroom (SE 6) or the chemistry stockroom (SE 18) if the attendant is not present. Do not enter the physics or chemistry stockrooms unless requested to do so by the instructor or the technician.

- Some experiments you perform will involve the use of electronic circuits that you will need to set up (some of these may utilize high voltage power supplies). Have your instructor check and OK your circuit before you power it up to avoid damage that might arise from improper wiring.

- Make sure that you do not arrive late to lab. The first portion of each lab session includes a discussion of the operation of and safety considerations for the equipment you will be using.

I have read, heard discussed, and understand the above rules and items concerning safety and proper behavior in the Physics B4C laboratory, and I agree to abide by them.

Sign: _____ Date: _____

PHYS B4C — CALENDAR — SPRING 2020

	MONDAY	TUESDAY	LAB	THURSDAY	FRIDAY
WEEK 1	1-20 MLK JR DAY HOLIDAY	1-21 Electromag-netic Radiation CH34: REVIEW	LAB 0 Lab Orientation, Safety, Survey	1-23 Reflection and Refraction CH35: pp. 1058-1072	1-24
WEEK 2	1-27	1-28 Dispersion, Dispersive Media CH35: pp. 1072-1077	L1 LAB 1 Reflection and Refraction	1-30 Plane and Spherical Mirrors CH36: pp. 1090-1100	1-31
WEEK 3	2-03	2-04 P35 Thin Lenses, Lens Systems CH36: pp. 1100-1113	L2 LAB 2 Spherical Mirrors	2-06 Optical Instruments CH36: pp. 1113-1123	2-07
WEEK 4	2-10	2-11 P36 Double-Slit Interference CH37: pp. 1134-1143	L3 LAB 3 Focal Lengths of Lenses	2-13 Thin-Film Interference CH37: pp. 1144-1150	2-14 LINCOLN DAY HOLIDAY
WEEK 5	2-17 WASHINGTON DAY HOLIDAY	2-18 P37 Diffraction Gratings, Spectra CH38: pp. 1160-1169	L4 LAB 4 Optics of the Human Eye	2-20 Diffraction Gratings, Spectra CH38: pp. 1169-1182	2-21
WEEK 6	2-24	2-25 P38 EXAM 1 Chapters 35-38 (75 pts)	L5 LAB 5 Diffraction Gratings	2-27 Planck's Hypothesis CH40: pp. 1233-1240	2-28
WEEK 7	3-02	3-03 H37 Photo-Electric & Compton Effects CH40: pp. 1240-1248	L6 LAB 6 Michelson Inter-ferometer	3-05 H37 De Broglie Hypothesis, HUP CH40: pp. 1249-1259	3-06
WEEK 8	3-09	3-10 P40 Probability Density, 1-D Box CH41: pp. 1267-1277	LAB 7 Black Body Radiation	3-12 H41 Schroedinger Wave Equation CH41: pp. 1277-1279	3-13
WEEK 9	3-16	3-17 H37 Wave Equa-tion Applications CH41: pp. 1279-1289	L7 LAB 8 Photo-Electric Effect	3-19 Bohr Hy-drogen Model CH42: pp. 1296-1305	3-20
WEEK 10	3-23	3-24 P41 Q-Mechan-ical Hydrogen CH42: pp. 1306-1317	L8 LAB 9 Quantum Mech-anical Oscillator	3-26 Atomic Tran-sitions and Spectra CH42: pp. 1318-1331	3-27
WEEK 11	3-30	3-31 P42 EXAM 2 Chapters 40-42 (75 pts)	L9 LAB 10 Hydrogen Spectrum	4-02 Nuclear Structure / Models CH44: pp. 1380-1390	4-03
RECESS	4-06 SPRING RECESS	4-07 SPRING RECESS	SPRING RECESS	4-09 SPRING RECESS	4-10 SPRING RECESS
WEEK 12	4-13	4-14 Radioactivity, Decay Processes CH44: pp. 1390-1402	L10 L11 LAB 11 Diatomic Molecules	4-16 Decay Rates, Radiometric Dating CH44: pp. 1402-1409	4-17
WEEK 13	4-20	4-21 P44 Nuclear Fission Reactions CH45: pp. 1418-1425	LAB 12 Nuclear Decay and Half-Life	4-23 P44 Nuclear Fusion Reactions CH45: pp. 1425-1426	4-24
WEEK 14	4-27	4-28 P45 EXAM 3 Chapters 44-45 (50 pts)	L12 LECTURE Principles of STR CH39: pp. 1192-1200	4-30 Time Dilation, Length Contraction CH39: pp. 1200-1207	5-01
WEEK 15	5-04	5-05 Lorentz Transformations CH39: pp. 1207-1214	FINAL EXAM REVIEW	5-07 Relativistic Mo-mentum & Energy CH39: pp. 1214-1223	5-08
WEEK 16	5-11 FINAL EXAMS	5-12 FINAL EXAMS	5-13 FINAL EXAMS	5-14 P39 FINAL 7:30-9:50 am (150 points)	5-15 FINAL EXAMS

MATH

$C_{circle} = 2\pi r$
$A_{circle} = \pi r^2$
$V_{sphere} = (4/3)\pi r^3$
$V_{cylinder} = \pi r^2 h$
$\mathbf{V} = V_x\mathbf{i} + V_y\mathbf{j}$
$V_x = V\cos\theta \quad V_y = V\sin\theta$
$\theta = \tan^{-1}(V_y/V_x)$
$V = [V_x^2 + V_y^2]^{1/2}$
$\varepsilon << 1 \Rightarrow (1 \pm \varepsilon)^n \cong 1 \pm n\varepsilon$
$x = (-b \pm [b^2 - 4ac]^{1/2})/2a$

CONSTANTS

$g = 9.8\ m/s^2 = 32\ ft/s^2$
$m_e = 9.11x10^{-31}\ kg$
$m_p = 1.67x10^{-27}\ kg$
$e = 1.6X10^{-19}\ C$
$c = 3.0x10^8\ m/s$
$k_e = 9.0X10^9\ N{\cdot}m^2/C^2$
$k_B = 1.38X10^{-23}\ J/K$
$h = 6.63x10^{-34}\ J{\cdot}s$
$hc = 1240\ eV{\cdot}nm$
$N_A = 6.02x10^{23}\ mole^{-1}$
$m_{proton} = 1.007276\ u$
$m_{neutron} = 1.008665\ u$
$m_{electron} = .000549\ u$
$a_o = .0529\ nm$
$R_H = .01097\ nm^{-1}$
$\lambda_C = .00243\ nm$

CONVERSIONS

1 cal = 4.19 J
$1\ eV = 1.6x10^{-19}\ J$
$1\ year = 3.16x10^7\ s$
1 Bq = 1 decay/s
$1\ Ci = 3.7x10^{10}\ Bq$
$1\ u = 931.5\ MeV/c^2$
$T_C = T_K - 273$

OPTICS

$\theta_1 = \theta_1'$
$c = f\lambda$
$n = c/v = \lambda_o/\lambda_n$
$n_1\sin\theta_1 = n_2\sin\theta_2$
$\theta_c = \sin^{-1}(n_2/n_1)$
$M = \pm h_i/h_o = -q/p$
$1/f = 1/p + 1/q$
$q = pf/(p - f)$
$p = qf/(q - f)$
$f = pq/(p + q)$
$f = r/2$
$1/f = (n - 1)(1/R_1 - 1/R_2)$
$f_{AB} = f_A f_B/(f_A + f_B)$
$m = \theta/\theta_o$
$m_{max} = 1 + (25\ cm)/f$
$m_{min} = (25\ cm)/f$
$m = -L(25\ cm)/f_o f_e$
$m = f_o/f_e$
$\theta_{min} = \lambda/a$
$\theta_{min} = 1.22\lambda/D$
$r_1 - r_2 = m\lambda$ or $(m + .5)\lambda$
$d\sin\theta = m\lambda$ or $(m + .5)\lambda$

$4dn_2 = m\lambda_o$		
$order_n$	ref_{max}	ref_{min}
in	m_{even}	m_{odd}
out	m_{odd}	m_{even}

$I(\theta) = I_o\cos^2[\pi d\sin\theta/\lambda]$
$m\lambda = a\sin\theta$
$I(\theta) = I_o[\sin(\pi a\sin\theta/\lambda)/(\pi a\sin\theta/\lambda)]^2$
$R = \lambda/\Delta\lambda = Nm$

RELATIVITY

$\beta = v/c$
$\gamma = [1 - \beta^2]^{-1/2}$
$T = T_o\gamma$
$L = L_o/\gamma$
$u_x' = (u_x - v)/(1 - u_x v/c^2)$
$u_x = (u_x' + v)/(1 + u_x' v/c^2)$
$p = mv\gamma$
$P = pc$
$K = mc^2(\gamma - 1)$
$M = mc^2$
$E = mc^2\gamma$
$E = K + M = [P^2 + M^2]^{1/2}$
$K = q\Delta V$

QUANTUM

$\lambda_{max}T = 2.9x10^6\ nm{\cdot}K$
$I = 2\pi hc^2/\lambda^5(e^{hc/\lambda kT} - 1)$
$E_n = nhf$
$E = hf = hc/\lambda$
$K = hf - \phi$
$\lambda = \lambda_o + \lambda_C(1 - \cos\theta)$
$1/\lambda = R_H(1/2^2 - 1/n^2)$
$E_i - E_f = \Delta E = hf = h\omega$
$E = -k_e e^2/2r$
$r_n = n^2h^2/4\pi^2 m_e k_e e^2$
$a_o = h^2/4\pi^2 m_e k_e e^2$
$r_n = n^2 a_o$
$E_n = -(13.6\ eV)/n^2$
$1/\lambda = R_H(1/n_f^2 - 1/n_i^2)$
$\lambda_{dB} = h/p = h/mv$
$\Delta x\Delta p_x \geq h/4\pi$
$P_{ab} = \int \psi^*\psi dx$
$1 = \int \psi^*\psi dx$
$\lambda = 2L/n$
$\psi = A\sin(n\pi x/L)$
$E_n = h^2n^2/8mL^2$
$-(h^2/2m)\psi'' + U(x)\psi = E\psi$
$E_n = (n + .5)hf$
$1/\lambda = R_H(1/n_f^2 - 1/n_i^2)$
$\Delta E = (13.6\ eV)(1/n_f^2 - 1/n_i^2)$

ATOMIC

$U(r) = -k_e e^2/r$
$K = .5mv^2 = k_e e^2/2r$
$E = K + U = -k_e e^2/2r$
$L_{orbital} = [l(l + 1)]^{1/2}h$
$L_{spin} = [3/4]^{1/2}h$
$L_z = m_l h$
$E_n = (-13.6\ eV)Z_{eff}^2/n^2$

NUCLEAR

$E = mc^2$
$r = r_o A^{1/3}$
$R = -dN/dt = \lambda N$
$t_{1/2} = \ln 2/\lambda$
$N = N_o e^{-\lambda t}$
$R = R_o e^{-\lambda t}$
$t = [\ln(N_o/N)]/\lambda$
$t = [\ln(R_o/R)]/\lambda$
$Q = (m_r - m_p)(931.5\ MeV/u)$
$E_b = (Zm_p + Nm_n - M_A)c^2$
$e_b = E_b/A$
$k_e Z_1 Z_2 e^2/r_{min} = 3k_B T_{min}$

WEBASSIGN ACCOUNT SET-UP GUIDE

- Go to: www.webassign.net/login.html
- Click Enter class key
- Enter bakersfield | 5004 | 9429
- Click **Enroll**
- Click **Yes, this is my class.**
- Select: I need to create a WebAssign account.
  or: I already have a WebAssign account.
- Click **CONTINUE** and proceed.

WEBASSIGN FEE OPTIONS

Problems + e-book w/ LOE (previously)	$ 0
Problems + e-book (single term)	$ 100

SYSTEM REQUIREMENTS

WebAssign is tested and supported for:

- Firefox (60+) (Linux, MacOS, Windows)
- Chrome (74+) (Windows, MacOS)
- Internet Explorer (11+) (Windows)
- Edge (11/17+) (MacOS, Windows)
- Safari (11+) (iOS, iPad only)

BROWSER SETTINGS

- allow cookies & pop-ups from webassign.net
- do not allow browser to store your password
- enable Adobe Flash Player

ASSIGNMENT		SUBMISSION DEADLINE		
CHAPT 35	(10 pts)	TUE	2-04-20	6:00 am
CHAPT 36	(10 pts)	TUE	2-11-20	6:00 am
CHAPT 37	(10 pts)	TUE	2-18-20	6:00 am
CHAPT 38	(10 pts)	TUE	2-25-20	6:00 am
CHAPT 40	(10 pts)	TUE	3-10-20	6:00 am
CHAPT 41	(10 pts)	TUE	3-24-20	6:00 am
CHAPT 42	(10 pts)	TUE	3-31-20	6:00 am
CHAPT 44	(10 pts)	TUE	4-21-20	6:00 am
CHAPT 45	(5 pts)	TUE	4-28-20	6:00 am
CHAPT 39	(10 pts)	THU	5-14-20	6:00 am

LOGGING IN & USING

- Go to **www.webassign.net/login.html**
- Enter: username, institution code, password
- Click **Log In**
- Select class from **My Classes** menu
- Click on assignment name
- Answer assignment questions and submit
- Resubmit your corrected answers
- When you are done, always click **Log Out**

WEBASSIGN PRESETS

- You are allowed 5 submissions per problem part.
- Answers for problem parts may be submitted individually.
- Scoring is done using last answers submitted.
- You may save your progress (not a submission).
- You are given randomized values in problems.
- **Hints** shown for some problems after first submission.
- **Tutorials** and **e-book** available for all problems.
- **Practice another version** is available for random problems.
- **Answer keys** available for all problems after submission deadline.
- **Solution steps** shown for some problems after submission deadline.
- Previous problem reponses viewable at all times.
- Correction marks viewable after 1st submission.
- Note: all submission deadlines are at 6:00 am.

CUSTOMER SUPPORT

WebAssign Customer Support is fast and free:

- online: webassign.net/manual/student_guide
- phone: 1-800-354-9706

The WebAssign Support staff **cannot:**

- change your username or password
- give assignment extensions
- change your score
- give you extra submissions
- help you with assignment content