

June 18, 2016  
Hans P. Paar

## 4B SYLLABUS

### NEWS ITEMS, LAST ON TOP

6/18/2016: I notice that I did not post the solutions to the Final. They and the Final itself have now been posted.

6/16/2016: The course grades have been posted. The grades have been assigned as follows:  $610 \leq A^+$ ,  $570 \leq A < 610$ ,  $530 \leq A^- < 570$ ,  $490 \leq B^+ < 530$ ,  $450 \leq B < 490$ ,  $410 \leq B^- < 450$ ,  $370 \leq C^+ < 410$ ,  $330 \leq C < 370$ ,  $290 \leq C^- < 330$ ,  $210 \leq D < 290$ ,  $F < 210$ . The scores of students who withdrew from the class during the quarter did not figure in setting the boundaries for the letter grades. Please check the entries on the grade sheet for correctness and let me know of any discrepancy. Histograms for the final and the course as a whole are posted as well. The blue books from the final are located in the corridor immediately outside my office. Blue books for Quizzes are located inside my office. Please let me know if you want these back.

I have enjoyed teaching 4B (and 4A) and your active participation in the course(s). This was a difficult course as you well know. Therefore a  $C^-$  or higher should be considered a "good" grade, a  $B^-$  or higher should be considered a "very good" grade, and an  $A^-$  or higher should be considered an "excellent" grade.

6/13/2016: A spreadsheet with scores from 4B in 2015 was posted on the 4B website by accident. The correct spreadsheet has now been posted. Please check it.

6/4/2016: There will be two extra office hours next week. One is on Monday 6/6 starting at 5:00 pm and the other on Wednesday 6/8 from 3:30 pm - 5:30 pm. Both will be in the usual place, my CASS office.

The following sections from Giancoli will not be on the Final: Section 16-8, 16-9, 17-5, 17-10, 18-3 through 18-5, 18-7, 19-5, 19-10, and 20-7 through 20-11. This is not because that material is not important, on the contrary, so I hope that you will take the time during the summer to study these sections.

The solutions to the homework of Chapter 20 have been posted.

6/1/2016: The solutions to the Statistical Physics homework and to Quiz #4 have been posted as well as Quiz #4 itself.

5/26/2016: The scores of Quiz #4 and their histogram have been posted.

5/25/2016: A student pointed out that the StatPhys.pdf documents does not state in its section on diatomic molecules that besides average potential energy  $\langle U \rangle$  there is an equal amount of average kinetic energy  $\langle K \rangle$  in the vibration. Thus the total number of degrees of freedom from vibration is two and the total average energy of vibration is  $\langle E \rangle = \langle U \rangle + \langle K \rangle = kT$ . A corrected StatPhys.pdf document has been posted.

5/22/2016: The corrected solutions to Quiz #3 and the new scores after Quiz #3 regrades have been posted. Quiz #3 blue books will be returned tomorrow 5/23 in class. Please check your score.

5/19/2016: A student pointed out that Equation (2) in the StatPhys.pdf document has an error. The second term on the right should have  $dz(dP/dz)$  instead of  $z(dP/dz)$ .

Another student pointed out that the integration limits in Equation (21) should be  $-\infty$  to  $+\infty$  instead of 0 to  $\infty$  because  $v_x$  can be positive and negative. Because the numerator and denominator are even functions of  $v_x$ , both get a factor 2 with these new integration limits and those factors of 2 cancel so the answer is still correct.

5/16/2016: Quiz #4 will be on the material through and including Chapter 19. The following sections have been skipped and their material will not appear on the Quiz: Section 16-8, 16-9, 17-5, 17-10, 18-3 through 18-7, 19-4, 19-5, and 19-10. The entire content of the StatPhys.pdf document is Quiz #4 material.

The solutions to the homework of Chapters 18 and 19 have been posted.

5/16/2016: Minor changes have been made in StatPhys.pdf. It has been reposted.

5/13/2016: There is no office hour today, instead there will be an extra office hour next Monday 5/13 at 5:00 pm in the usual location.

The Quiz2.pdf file has been refreshed and is now readable again. A homework problem set for Statistical Physics has been posted.

5/11/2016: The scores, their histogram, and the solutions to Quiz #3 as well as Quiz #3 itself have been posted.

5/9/2016: A slightly edited version of the StatPhys document has been posted with today's date on it.

5/8/2016: We will deviate from the textbook this week to get a taste of Statistical Physics. Because that material is not in Giancoli, but should be, a document discussing it has been posted. Please study it in parallel with the discussion of Statistical Physics in class.

Also, an edited version of the document on longitudinal waves has been posted with hopefully all typos corrected.

5/3/2016, second posting: The LongWaves.pdf file has been posted again, this time with Figures. I have found three typos: (i) Between the second Figure and (14) you see  $\rho_0 A \Delta$ . This should be  $\rho_0 A \Delta x$  and (ii) in (22) the exponent  $\gamma$  is missing and (iii) The factor 5/9 in (29) should be 1/3.

5/3/2016: A preliminary version of a document deriving the wave equation for longitudinal waves has been posted. Figures are the same as in the lecture and will be added.

5/1/2016: The solutions to the homework of Chapters 16 and 17 have been posted.

4/27/2016: The scores, their histogram, and the solutions to Quiz #2 as well as Quiz #2 itself have been posted.

4/19/2016: Sections 12-5 (Fracture), 12-6 (Trusses and Bridges), 12-7 (Arches and Doms) and Sections 13.11 (viscosity), 13.12 (Flow in Tubes: Poiseuille's Equation, Blood Flow), 13.13 (Surface Tension and Capillarity), and 13.14 (Pumps, and the Heart) have not been covered in the lectures and will not appear on a Quiz or the Final. That does not mean that this material is not important but merely that we have run out of time.

Material of Chapter 15 up to and including 15-5 may be on the Quiz #2.

The solutions to the homework of Chapters 13 and 15 have been posted.

4/16/2016: The solutions to Quiz #1 and Quiz #1 itself have been posted.

4/14/2016: The scores and histogram of the scores of Quiz #1 have been posted.

4/5/2016: The solutions to the homework of Chapters 12 and 14 have been posted. Sections 12-6 and 12-7 of Giancoli should be read (and enjoyed) but their content will not be on the Quiz.

4/3/2016: We have discussed in class some aspects of Differential Equations. A document at the 4B website called DiffEqns.pdf reviews that material. You will get all this again in Math 20D but in the meantime please study this document.

4/1/2016: The homework assignment for Chapter 12 is added below.

3/18/2016: No news yet. Stay tuned.

## COURSE ORGANIZATION

Course instructor: Hans P. Paar  
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858 246 0405 (office phone)

Teaching assistant: Yury Kiselev  
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858 242 9171 (phone)

Grader: Thyagarajan Venkatanarayanan  
tvenkata@eng.ucsd.edu (e-mail)

Lectures: Mondays - Wednesdays - Fridays 11:00 am - 11:50 am in York 2622  
Thursdays 8:00 am - 8:50 am in WLH 2204 (Quizzes only: overflow in WLH 2209)

Problem sessions: Tuesdays 7:00 pm - 8:50 pm in CH 217B

Discussion sessions: Tuesdays 7:00 pm - 8:50 pm in CH 217B

Final's date and time: Friday 6/10/2016 11:30 am - 2:30 pm in York 2622

Office hour: Instructor: Fridays 5:00 - 7:00 pm at SERF 322A  
TA: Mondays at 4:00 - 6:00 pm in MH 5202

Course URL: See <http://physics.ucsd.edu/~hpaar/4B/>

Textbook: Douglas C. Giancoli, Physics for Scientists and Engineers, 4th edition  
We will do Chapters 12 - Chapter 20

There will be homework assignments each week and four quizzes during the quarter in alternate weeks. The first quizz is on April 7. The others are on April 21, May 5, and May 19. You are encouraged to work together on the homework sets. The homework will not be collected or graded. Solutions to home assignments will be posted in <http://physics.ucsd.edu/~hpaar/4B/>, usually one or two days before the quiz.

## COURSE OUTLINE

Physics 4B covers oscillations, waves including sound waves, heat, and thermodynamics. In week 7 you will get a taste of Statistical Physics as an appetizer for a future course in that subject. This is also where Physics 4B clearly differentiates itself from Physics 2C. Because statistical mechanics is not treated in the text book, lecture notes on that topic will be provided through the course's website.

The catalog states that Math 20B (single variable calculus) is a prior requirement and that Math 20C (multivariable calculus) may be taken concurrently with Physics 4B. So we will use mutivariable calculus and differential equations. Differential equations will be introduced from first principles, not unlike the historical situation when differential equations were first encountered in Physics before they became a topic of their own in mathematics.

## COURSE SCHEDULE

The class schedule and homework assignments are listed below:

Week	Dates	Chapter	Homework
1	3/28 - 3/30	12	4, 7, 10, 13, 21, 32, 34, 35, 36, 40, 59, 66, 70, 98
1	3/31 - 4/1	14	Q: 2, 5, 8, 11, 14 P: 3, 4, 5, 10, 13, 14, 19, 24, 28, 31, 35, 41, 45, 47, 52, 59, 60, 67, 81

2	4/4 - 4/8 4/7	13	Q: 2, 4, 9, 10, 15, 18, 19, 26, 35, 36, 39, 47, 49, 50, 52, 95 Quiz # 1
3	4/11 - 4/15	15	Q: 5, 6, 7, 10, 18 P: 3, 6, 8, 11, 12, 15, 16, 22, 24, 26, 28, 29, 32, 34, 37, 42, 45, 48, 51, 54, 55, 60, 63, 65, 67, 68
4	4/18 - 4/22 4/21	16	Q: 3, 4, 5, 6, 10, 13, 16, 18 P: 3, 7, 8, 13, 14, 18, 34, 45, 56, 61, 63, 65, 66 Quiz # 2
5	4/25 - 4/29	17	Q: 2, 5, 9, 11, 15, 16, 17 P: 6, 7, 10, 11, 14, 15, 20, 22, 25, 31, 33, 37, 41, 42, 48, 52, 53, 55, 56
6	5/2 - 5/6 5/5	18	Q: 2, 12, 13, 14, 16, 21 P: 2, 3, 6, 7, 9, 11, 14, 19, 21, 22, 25, 27, 29, 30, 31, 32, 40, 41, 48, 53 Quiz # 3
7	5/9 - 5/13	Notes on statistical physics, problems tba	
8	5/16 - 5/20 5/19	19	Q: 3, 5, 7, 8, 9, 18, 20 P: 2, 3, 6, 9, 10, 12, 15, 17, 19, 20, 22, 24, 25, 27, 31, 32, 33, 35, 38, 51, 53, 89 Quiz # 4
	5/23 - 5/25	19	Q: 26, 30 P: 58, 61, 62, 63, 64
9	5/25 - 5/27	20	Q: 1, 2, 5, 11 P: 1, 6, 12, 18, 20, 26, 27, 31
10	5/30 - 6/3 5/30	20	Q: 13, 15, 16, 17, 19, 20 P: 32, 33, 35, 37, 39, 42, 44, 45, 46, 48, 50, 69, 72, 73, 78 Holiday (Memorial Day)

## FURTHER INFORMATION

Quizzes will be closed book. All students are required to purchase bluebooks for taking quizzes. At the first quizz you will be assigned a 3-digit code number. Your assigned code number and course id (4B) should be written on the cover of your bluebook. Do not write your name on the bluebook for confidentiality reasons as the bluebooks will be returned together. Write your answers in ink, not pencil. You will not loose points when you cross out incorrect text. You will be able to collect your quizz at the end of a lecture. Solutions to the quizzes and grades by code number will be posted on the 4B webpage. Please check your grades promptly to make sure they are recorded correctly.

Appeals to the grading of the quizzes should be made in writing within one week from the day the graded quizzes were returned. Do not write in the bluebook but rather attach a sheet of paper with your appeal and give it to the TA. Grade changes will only be considered if the quizz is written in ink, not pencil. Contact the instructor if a problem is not resolved after a discussion with the TA.

The three quizzes with the highest scores will be counted toward the course grade so you can drop one quizz without penalty. Therefore there will be no makeup quizzes. In case of illness, documented with a letter from a physician or nurse, an accommodation will be made if more than one quizz is missed because of the illness.

The course grade will consist of 50% from the best three out of four quizzes and 50% from the Final. There will be no makeup Final so please appraise yourself of the Final's date before making plans to leave town.

Please remind yourself of the "UCSD Policy on Integrity of Scholarship" in the UCSD catalog. I do not expect to encounter a problem in this area but if I do these rules will be strictly enforced.