



Department of Computing CSC 1204: Physics (3+1)

Activity	Dates	Day and Timing
Teaching	February 6 – May 20, 2017	Saturdays 1145h-1445h; 1515h-1815h
Mid-Term Examination	March 25, 2017	Saturday 1145h-1345h; 1515h-1715h
Finalize topic of assignment by the above date		followed by class
Presentations	May 06, 2017	Saturday 1145h-1445h; 1515h-1815h
Final Examination	May 20, 2017	Saturday 1145h-1415h; 1515h-1745h

Course Supervisor: Professor Dr. Syed Arif Kamal

PhD (Neurophysics); MSc *summa cum laude* (Physics), BSc (Hons) *summa cum laude* (Physics)
MA (Johns Hopkins, United States); MS (Indiana, Bloomington, United States)
Ex-Chairman, Departments of Applied Physics and Computer Science,
Ex-Dean, Faculties of Science and Engineering,
University of Karachi; Ex-Convener, NCRC, HEC; Ex-Convener, Subject Committee, NTS
Ex-Convener, Sub-Committee (Academics), the Education Committee, Transparency Int. Pakistan

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Handout Address: https://www.ngds-ku.org/SZABIST/CSC1204_17.pdf

Course Objectives

To give the students an introduction of functional physics for students of computer science illustrating relationship to computing concepts in the hardware and the software domains.

Course Outline

Unit 1: Fundamentals of scientific method, role of observations and experiments in validating a scientific model, problem solving in classroom, laboratory

and industry, qualities of a good model

Unit 2: Kinematics and dynamics (hows and whys of motion), conservation laws

Unit 3: Gravitational and inertial mass, inertial frame, relative and absolute quantities, conditions of equilibrium, types of equilibrium and stability

Unit 4: Phases of matter, forces of nature and constituents of matter

Unit 5: Simple-harmonic motion, damped and driven oscillators, waves as carriers of information

Assignment

Using the information available on https://www.nobelprize.org/nobel_prizes/physics prepare a write-up of 5-10 pages on the work of a Physics Nobel Laureate (no duplication allowed, finalize name by March 25, 2017) and give a presentation of 3-5 minutes (on May 6, 2017) using multimedia, posters and demonstration, outlining the prize-winning contribution, unique qualities of the personality and lessons learnt from life for the Pakistani physicists.

Recommended Reading

- Resnick, R., D. Halliday and J. Walker (2010). *Principles of Physics*, 9th Edition, John Wiley, Hoboken, New Jersey, United States
- Young, H. D. and R. A. Freedman (2015). *Sears and Zemansky University Physics with Modern Physics*, 14th Edition, Pearson Education, London, United Kingdom

Motivational Reading

- Kamal, S. A. (2008, December 18-20). From mathematics to technology: A bridge through physics and engineering. *Proceedings of the International Conference on Physics and the World of Today*, edited by Jafri, M. A. and S. M. Naqvi, Department of Physics, University of Karachi, Karachi, Pakistan, pp. 32-39 (invited lecture), full text: <https://www.ngds-ku.org/Papers/C70.pdf>
- Kamal, S. A. (2003, February 7-9). The training of a physicist: From concept building to problem-solving skills. *The Second International Conference on Physics Education*, Center of Physics Education, National Center for Physics and Department of Physics, University of Karachi, Karachi, Pakistan (concluding talk + recommendations of the conference), full text: <https://www.ngds-ku.org/Papers/C57.pdf>
- Siddiqui, K. A. and S. A. Kamal (1986, December 27, 28). Physics makes the deaf and the dumb equations of mathematics to speak. *Proceedings of the Second Workshop on Teaching of Physics*, edited by Hasnain, A. F., Karachi, Pakistan, pp. 40-49, full text: <https://www.ngds-ku.org/Papers/C25.pdf>



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Course Plan

Classes on Saturdays • Handouts and sample papers to be uploaded on Thursdays

Date	Topic (to be covered)
February 11	Introduction, motivation and fundamentals of scientific method What is Science? https://www.ngds-ku.org/Articles/A15.pdf What is a Scientific Method All About? https://www.ngds-ku.org/Articles/A18.pdf Observations and Experiments in Science? https://www.ngds-ku.org/Articles/A19.pdf Handling Industrial Projects? https://www.ngds-ku.org/Articles/A20.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_Introductory.pdf
18	Hows of motion: Kinematics Handout A — https://www.ngds-ku.org/SZABIST/Handout_A.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_A.pdf
25	Whys of motion: Dynamics • First Quiz Handout B — https://www.ngds-ku.org/SZABIST/Handout_B.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_B.pdf
March 04	Conservation laws Handout C — https://www.ngds-ku.org/SZABIST/Handout_C.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_C.pdf
11	Elastic and inelastic collisions • Second Quiz Handout D — https://www.ngds-ku.org/SZABIST/Handout_D.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_D.pdf
18	Gravitational and inertial mass, smart choice of coördinate system, inertial frame, relative and absolute quantities Handout E — https://www.ngds-ku.org/SZABIST/Handout_E.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_E.pdf Review Session for Mid-Term Exam Sample Paper — https://www.ngds-ku.org/SZABIST/Sample_MT.pdf
25	Mid-Term Exam
April 01	Conditions of equilibrium, types of equilibrium and stability Handout F — https://www.ngds-ku.org/SZABIST/Handout_F.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_F.pdf
08	Phases of matter, forces of nature and constituents of matter • Third Quiz Handout G — https://www.ngds-ku.org/SZABIST/Handout_G.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_G.pdf
15	Kinetics of simple-harmonic motion with an introduction to damped and driven oscillators Handout H — https://www.ngds-ku.org/SZABIST/Handout_H.pdf Review Questions — https://www.ngds-ku.org/SZABIST/Review_H.pdf
22	Presentation on 'Presentation Skills' (to prepare for May 6 presentations)
29	Waves and their role as carriers of information • Fourth Quiz Handout I https://www.ngds-ku.org/SZABIST/Handout_I.pdf (available) Review Questions https://www.ngds-ku.org/SZABIST/Review_I.pdf
May 06	Presentations (assignments to be turned in)
13	Review Session for Final Exam Sample Paper — https://www.ngds-ku.org/SZABIST/Sample_Final.pdf
20	Final Exam

Marks Breakdown

Evaluation Parameter	Marks	Evaluation Parameter	Marks
Quizzes ^{\$}	15	Presentation [@]	15*
Assignment [#]	10	Mid-Term Examination	20*

^{\$} 4 quizzes (each one 5 marks) taken, best 3 counted

[#] 50% deduction of marks for late submission

[@] 50% deduction of marks for late presentation; to prepare and give an effective presentation, look at:
<https://www.ngds-ku.org/Professional/HEC01.pdf>

*. Request for change of grading plan sent to Program Coördinator