Special Theory of Relativity PHY 226B

Instructor: *Gautam Sengupta, Dept. of Physics*

Office FB 473, Phone: 7139
e-mail: sengupta@iitk.ac.in
Website: http://home.iitk.ac.in/˜ sengupta/

Course contents: Refer to DOAA Website. The syllabus is a tentative list of topics. Choice of topics and extent of coverage is left for the Instructor.

Lecture Plan: *Tentative plan of 18 + 6 lectures + tutorials* Tutorials would be problem solving sessions and would held as and when required subject to the limit of 6 tutorials as per 3:1 Lecture/Tutorial ratio.

Office Hour: Will be fixed in consultation with the class.

Evaluation: *Quiz 25, End Semester: 30 marks MCQ with multiple correct options + 45 Subjective=75. Total 100 Marks for the course. There may also be surprise quiz with minimum notice if required.* It is advised that the students keep upto date with the course. Make Up Exams or Quiz as per Senate guidelines.

Unfair Means Warning : *Any attempt detected to use unfair means in exams will attract serious disciplinary consequences and reported to SSAC. Please stay warned.*

Texts and References: *Robert Resnick (Relativity), C. G. Griffiths (Electrodynamics).*

Tips : Attend all lectures and tutorials and solve the problem sheets. Course and evaluation will be geared towards the Lectures. *Attendance in all lectures and tutorials is compulsory. There will be random attendance calls and absence without information and sufficient reasons will be recorded and penalized in grading.*

Fail Grade: Less than minimum required marks in the relative grading scheme. *It will be incorrect to assume that there will be no failures in the course.*

Tentative Lecture Plan

Number of Sessions: *Total 18L + 6T=24 sessions*

1. Frames of reference and Inertial Frames. Galilean Relativity. Experiments for constancy of the speed of light. Special Relativity. *(3L +1T).*

2. Special Theory of Relativity. Einsteins postulates. Relativity of simultaneity. Space time continuum. Lorentz transformations. Length contraction and time dilation. *(3L +1T).*

3. Four dimensional Minkowski space time. 4 vectors. Light cone structure. Space time diagrams. Twin Paradox. *(4L +1T).*

4. Relativistic Mechanics. 4 velocity, 4 acceleration, 4 force, 4 momentum, mass energy equivalence. Kinematics of relativistic collisions. *(4L+2T).*

5. Relativistic electrodynamics. Transformations of electric and magnetic fields. Covariant Maxwell equation. *(4L+1T).*