

**Department of Physics, IIT Kanpur**  
**First course handout**  
**RELATIVITY (PHY226M) — Modular course (2nd half)**

Class will commence on 3rd March 2025.

Duration of the course: Half semester (Beginning of March to end of April, 2025)

Instructor: Swagata Mukherjee.

Office: 102, Block A, First floor, Sustainable energy engineering building, Near Media Lab.

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Classes on Tuesday, Thursday, Friday 11:00-12:00

Tutorial on Wednesday 11:00-12:00

Venue: Will be announced by email in end of February.

Recommended mode of contact beyond class timing: Email. If you want to meet to discuss something about PHY226M, set up an appointment via email.

Books:

- (1) Introduction to Special Relativity by Robert Resnick
- (2) Special Relativity by A.P. French
- (3) Special Relativity for the enthusiastic beginner by David Morin

Please note that some more references will be given during lectures.

Syllabus of this course:

Empirical evidence for the constancy of  $c$ ; Frames of reference; Lorentz transformations; Relativity of simultaneity; Twin and other paradoxes; Spacetime diagrams; Transformation laws for velocity, momentum, energy; Mass energy equivalence; Four vectors; Force equations; Kinematics of decays and collisions; Maxwell's equations in covariant form.

### Grading:

There will be **two quizzes** and **one end-semester exam** in this course.

Weightage: End-sem (50%), Quizzes (25% each).

The first quiz will be held during the week of March 17th to 22nd.

The second quiz will be held during the week of April 7th to 12th.

Quizzes will take place during normal class-hours. Exact dates of the quizzes will be finalised and communicated a few days in advance. After the dates of the quizzes are communicated to all students, the dates will be considered final. Any request to shift the date of the quiz will not be entertained. Any such email will be ignored.

It is mandatory to appear for the end-semester examination, otherwise the final grade will be considered incomplete, even if you have total marks more than the final pass marks.

Please note that relative grading will be followed in this course.

A zero-tolerance policy for academic misconduct will be followed. Any academic wrongdoing (copying, use of unfair means in exams, impersonating, etc.) will be dealt with very strictly.

### Policy for leave during quizzes and end-semester exam:

- (1) Quizzes: All leaves by the students must be sanctioned by the SUGC chairperson via the DOAA office for this course. There will be no makeup exam for the quizzes. If we receive confirmation of someone's leave for the quizzes via the DOAA office and SUGC chairperson, then his/her case will be considered and a viva examination will be taken for that particular student as the replacement of the quiz. The viva examination may consist of solving problems on board. The difficulty level of the viva exam will match the difficulty level of the quiz.
- (2) End-semester exam: There will be a make-up exam for the end-semester exam only if the medical leave of any student is approved by the DOAA and the SUGC chairperson and if DOAA allows that student to appear in the make-up exam of this course.

Attendance: No marks for attendance, but you should attend all classes. Material taught in the class will NOT be shared in the form of typed or hand-written class-notes. So, for your best interest, try to follow all the classes closely.