Special Theory of Relativity

PHY 327 1.0 / 207 1.0 / 257 1.0 - Special Theory of Relativity (Optional Course available for students who are not offering Physics as a subject in the applied science faculty)

Course description

This course unit offered by the department of physics to both physical science students as well as biological science students. This is also an optional course available for students who are not offering Physics as a subject in the applied science faculty.

This course covers the fundamental aspects of Relativity such that Einstein's Special theory of Relativity and Introduction to Special theory of Relativity in Western and Eastern Philosophies.

Learning Objectives

1. Introduction in brief to Philosophical Background of Science.
2. Describe the Path to Relativity Theory.
3. Introduce the concept of Ether ("Luminifercus Ether").
4. Describe the existence of ether.
5. Explain Michelson – Morley experiment and its results.
6. Describe Einstein's Two Postulates in STR.
7. Explain & derive relativistic time equation.
8. Introduce proper time, improper time and time dilation.
9. Describe experimental background of time dilation.
10. Explain & derive relativistic length equation and describe length contraction.
11. Describe Doppler's effect in day to day life.
12. Explain and derive the equation of Doppler's effect of light.

13. Describe Einstein's $E = mc^2$ equation.

14. Describe relativistic energy, momentum and mass of a moving body.

15. Describe twin paradox of relativity.

16. Explain and derive transformation equations (Galileo's & Lorentz's)

17. Describe Vector Space in 4D.

18. Describe causality in western & eastern philosophy to strength to relativity theory.

19. Brief introduction to General Theory of Relativity (GTR).

20. Describe briefly some interesting concepts in GTR.

Learning Outcomes

On completion of the course unit PHY 323 2.0 or PHY 327 1.0 students will be able to,

1. Describe Philosophical Background of Science.

2. Describe the concept of Ether.

3. Explain Michelson – Morley experiment and its results.

4. Describe Einstein's Two Postulates of STR.

5. Explain & derive relativistic time equation.

6. Distinguish proper time & improper time.

7. Describe experimental background of time dilation.

8. Explain & derive relativistic length equation.

9. Derive the equation of Doppler's effect of light.

10. Describe Einstein's $E = mc^2$ equation.

11. Explain relativistic energy, momentum and mass of a moving body.

12. Describe twin paradox.

13. Describe Galileo's & Lorentz's transformation equations.

14. Describe Space in 4D.

15. Describe causality to strength for relativity theory.

16. Describe General Theory of Relativity (GTR).

Recommended reading

- Fundamentals of Physics – HALLIDAY / RESNICK / WALKER
- Newton to Einstein – Ralph Baierlein.
- On the shoulders of the Giants – Stephen Hawkins.
- The Brief Introduction of Time – Stephen Hawkins.
- Relativity for the Layman – James A. Coleman.
- Understanding special theory of Relativity – Y. R. Waghmare.
- Testing the Theory of Relativity – Brian Jones & Gerald Laban.
- Element of Special Relativity – S. P. Singh & M. R. Badge.
- What the Buddha Thought – Rev. Walpola Rahula.
- Special Relativity – A. P. Fench.
- Special theory of Relativity – B. L. Warsnop.
- Special theory of Relativity – David Bohm.
- An Introduction to the special theory of Relativity – Robert Kats.
- Introduction to the special theory of Relativity – James Smith.
- අභිධර්ම මාර්ගය - මහාචාර්ය පූජ්‍ය රේරුකානේ චන්දවිමල.
- අභිධර්මයේ මූලික කරුණු - මහාචාර්ය පූජ්‍ය රේරුකානේ චන්දවිමල.
- අභිධර්ම සමුච්චය - පූජ්‍ය හේන්පිටගෙදර ඥාණසීහ.
- සූත්‍ර පිටකය (දීඝ නිකාය, මජ්ඣිම නිකාය, සංයුක්ත නිකාය, අංගුත්තර නිකාය හා බුද්දක නිකාය) - බෞද්ධ සංස්කෘතික මධ්‍යස්ථානය අනුග්‍රහයෙන් මුද්‍රිතයි.

Method of teaching/learning

1. Lectures
2. Tutorial classes
3. Discussion classes
4. Discussion seminars (open to all)
5. Self studies

Method of evaluation

1. End of the semester examination   - (100%)