

# Cryogenic Engineering - Video course

## COURSE OUTLINE

This course assumes that the students have undergone UG courses in Engineering Mathematics, Thermodynamics, Heat Transfer and Refrigeration. The purpose of this course is to give introductory knowledge of cryogenic Engineering. The course also gives detailed knowledge of cryocoolers, on which research is going on world wide. The treatment is both theoretical and mathematical. The course will interest students wishing to embark on a research career in Cryogenic Engineering.

### Contents:

Cryogenics and its applications, Properties of cryogenic fluids, Properties of materials at cryogenic temperature, Gas-Liquefaction and Refrigeration Systems, Gas Separation, Cryocoolers, Cryogenic Insulations, Vacuum Technology, Instrumentation in Cryogenics, Liquid storage and transfer systems, Cryostat design, Dilution Refrigerator and Adiabatic Demagnetization.

## COURSE DETAIL

Sl. No	Topic	Hours
1.	Introduction to Cryogenics and its applications.	1
2.	Properties of cryogenic fluids.	2
3.	Properties of materials at cryogenic temperature.	3
4.	Gas-Liquefaction and Refrigeration Systems.	7
5.	Gas Separation.	6
6.	Cryocoolers.	7
7.	Cryogenic Insulations.	2
8.	Vacuum Technology.	3
9.	Instrumentation in Cryogenics.	4
10.	Cryostat design.	2
11.	Dilution Refrigerator and Adiabatic Demagnetization.	3



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Mechanical Engineering

### Pre-requisites:

Engineering Mathematics - Heat Transfer - Thermodynamics, Refrigeration.

### Additional Reading:

- Proceedings of Advances in Cryogenic Engineering.
- Proceedings of International Cryocooler Conference.

### Hyperlinks:

- National Institute of Standards and Technology:  
<http://www.nist.gov/index.html>

### Coordinators:

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**References:**

1. Randall F. Barron, "Cryogenics Systems", Second Edition Oxford University Press New York, Clarendon Press, Oxford, 1985.
2. Timmerhaus, Flynn, "Cryogenics Process Engineering", Plenum Press, New York.
3. Pipkov, "Fundamentals of Vacuum Engineering", Meer Publication.
4. G.M Walker. "Cryocooler-Part 1 Fundamentals" Plenum Press, New York and London.
5. G.M Walker. "Cryocooler-Part 2" Plenum Press, New York and London.