Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Lecture Notes

Live Session

Text transcripts

Introduction to Algebraic Topology (Part-I)

As stated above, this is a PG level course in Mathematics, which requires basic knowledge of Linear algebra, Point set topology, and group theory.This course is central to many areas in modern mathematics. The subject itself saw tremendous growth during 1950 and currently has attained a matured status.
The syllabus I have chosen is common to MA5102 at IIT Bombay and AFS-III program of National Centre for Mathematics. It has enough material common to the syllabi followed by several Universities and IIT's in the country and goes beyond. Nevertheless it has different flavour liked by variety of students. I have published a book in which one-third of the content is roughly the present course. This book is followed by several universities abroad also for their course.

INTENDED AUDIENCE : Anybody who would like to get trained in Algebraic Topology such as Computer scientists, Electrical , Aerospace engineers and mathematicians, and physicists.
PREREQUISITES : Point Set Topology is pre-requisite. Exposure to Basics of Linear algebra and Group theory is preferred.
INDUSTRIES SUPPORT : All IIT's, IISERs , TIFR and Universities in India.

Prof. Anant R. Shastri

IIT Bombay

I am a retired Emeritus Fellow of Department of Mathematics I.I. T. Bombay. After serving in School of Mathematics T.I.F.R. for 16 years I joined I.I.T. Bombay as a full professor in 1988.Apart from several research papers,in Algebraic and Differential Topology, Algebraic Geometry, Relativity theory, Group theory, etc.,I have published three books.Since 2004, I have constantly involved in the activities of ATM schools, The chief activity of these schools is to impart advanced training in Mathematics to Ph. D. students in various universities and research institutions in the country. These activities were initially funded by NBHM and currently adapted by National Centre for Mathematics, I.I.T. Bombay.Over the years, I have taught, roughly the contents of the proposed course more that 20 times to M.Sc/ BTech / MTech and Ph. D. students.CDEEP has recorded my lectures on Complex Analysis MA205 for B. Tech students, in 2008.

COURSE TYPE

Elective

COURSE LEVEL

Postgraduate

COURSE LAYOUT

Week 1: What is Algebraic Topology? -An experiment with Mobius band
Week 2: Path homotopy, Fundamental group and computation for a circle applications.
Week 3: Background from Pointset topology; Quotient spaces, compact open topology
Week 4: Relative homotopy, Typical constructions.
Week 5: Convex Geometry: Simplicial Complexes
Week 6: Subdivision and Simplicial Approximation
Week 7: GApplicarions
Week 8: Covering spaces: Lifting problem.
Week 9: Relation with Fundamental groups
Week 10: Seifert-Van Kampen Theorem; Free products and Free groups
Week 11: G-coverings and Applications
Week 12: Classification of Triangulated Compact Surfaces.

Teaching Assistants

1. Dr. Subhash B.
2. Dr. Ramesh Kasilingam
3. Mr. Vinay Sipani
4. Mr. Sivashankar B.
5. Mr. Bidhan Paul

BOOKS AND REFERENCES

1. Anant R. Shastri Basic Algebraic Topology, CRC Press, 2014
2. M.J. Greenberg and J. R. Harper, Algebraic Topology, A first course, Benjamin/Cummings Pub. Co. 1981.
3. J. R. Munkres, Topology lied Printice Hall.

CERTIFICATE

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams: **25 April 2021** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Bombay.It will be e-verifiable at nptel.ac.in/noc.

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.

- NPTEL team