

Course Outline and Objectives:

The course concerns fluid flow and rotor dynamics in turbomachines in compressible and incompressible flow regimes. The objective is to bring in coherence and reduce barriers that exist in understanding compressible and incompressible flow turbomachines from a practical perspective.

Course Contents:

Turbomachines – pumps, compressors and turbines. Modelling the physical process of impact of fluid on a rotating blade in a generalized turbomachine; variables and their functionalities; dimensional analysis. Fluid density variation under pressure gradient through a blade passage, Defining sonic speed; distinction between compressible and incompressible flows.

Quantitative design; hydraulic or aerodynamic design of blades; Euler's momentum equation, generalized loss models, NsDs charts, Cordier laws with correction for different fluid flows, mean line design versus model studies. Structural design of blades; centrifugal and yield stresses; failure modes; rotor dynamics; design under variability of parameters (enthalpy, flow rate, pressure, torque and speed). Daily cold start in renewable energy turbomachines; different methods for starting a stationary shaft; quick and efficient cold start. Design validation – computational fluid dynamics (CFD) tools, error analysis, experimental benchmarking.

Case studies of micro gas turbines, hydro turbomachines, specialized fluid turbomachinery (carbon dioxide, modern refrigerants, aircraft propulsion (turbo prop to supersonic engines), automobile turbochargers.

Course Organization:

The course will mainly consist of lectures and demonstration of practical turbomachines. The participants will be given assignments on individual course modules.

Faculty:

IISc faculty will deliver the lectures.

Eligibility:

The course is meant for faculty of AICTE – recognized engineering colleges. Selected teachers will be paid TA at actual subject to the limit of Three tier AC train/bus fare by the shortest route from the place of work to Bengaluru and back. **However, the maximum TA payable is Rs.3000/-.** They will be provided with a daily allowance of Rs.500/- (for 5 days only) towards boarding and lodging as per QIP rules, and will be supplied with the course materials. **The lodging charges will be Rs.300/- per day. Local participants will be paid DA @ Rs.150/- per day for 5 days.**

A few seats are available for non-sponsored (self-support) teachers, scientists from research labs, practicing engineers from industries and other interested persons. **A course fee of Rs.10,000/- will be charged to these participants.** This will entitle them to participate in the course and receive the course material. Single room **accommodation** is available on the Institute campus at the **Hoysala House**. The participants have to request in advance along with the registration form for such accommodation. The lodging charges will be **Rs.1000/- per day**, for self-support college teachers and **Rs.1500/- per day** for Industry participants, subject to availability of accommodation.

CENTRE FOR CONTINUING EDUCATION Indian Institute of Science, Bengaluru - 12

QIP Short Term Course On Design Nuances in Incompressible and Compressible Flow Turbomachines

17 – 21 October, 2016

Registration Form

(Please mail to reach before ~~30th September~~, 05th October, 2016)

1. Name.....
2. Age:..... Sex: Male/Female
3. Office address
.....
.....
.....
4. Landline No. with STD code:.....
5. Mobile No.
6. Email ID:.....
7. Academic Qualifications
Degree subject year University
Diploma/B.Sc./B.A.....
B.E/B.Tech/M.Sc.
M.E/M.Tech./M.Phil.....
Ph.D. Completed/Pursuing/Intend pursuing:.....
Thesis title/Proposed Research Area:.....
.....
.....
8. Teaching Experience.....(Years)

9. Industry Experience(Years)
10. Course taught/professional responsibilities.....

11. Accommodation required Yes / No
12. Self-support candidate : Rs. 10,000/-
 Demand Draft No..... dated.....

I agree to abide by the rules of the QIP courses. If selected, I shall participate in the course for the entire duration.

Date:
Place:

Signature

The applicant Mr/Ms.....

.....
 from our institution will be permitted to attend the QIP Short Term Course on “**Design Nuances In Incompressible And Compressible Flow Turbomachines**” to be held during **17th to 21st October, 2016** at the Indian Institute of Science, Bengaluru, if selected. He/she will be granted necessary leave of absence.

Place:

Date:

Signature of Head of the
Department

Signature and Seal of the
Principal of the Institution

(Xerox copy of this form may also be used)

Intending participants may use the attached application form or a xerox copy of the same. Applicants from AICTE recognized colleges are required to submit their applications sponsored by their colleges. Non-sponsored (self-support) teacher applicants should send their application along with a **DD for Rs.10,000/-** drawn in favour of “**Registrar, Indian Institute of Science, Bengaluru -560012**” payable at Bengaluru.

Deadlines:

Receiving completed applications:

~~30th September, 2016~~

05th October, 2016

Intimation of selection

~~3rd October, 2016~~

6th October, 2016

Please mail the filled-in application form to:

The Section Officer
 Centre for Continuing Education
 Indian Institute of Science
 Bengaluru - 560 012
 Telephone: 080-23600911, 2292055
 Email: so@cce.iisc.ernet.in/
 office@cce.iisc.ernet.in

To reach on or before ~~30th September, 2016,~~
05th October, 2016.

**QIP Short Term Course
On**

**DESIGN NUANCES IN INCOMPRESSIBLE
AND COMPRESSIBLE FLOW
TURBOMACHINES**

17 – 21 October, 2016

Coordinator

**Dr.- Ing. Punit Singh
Centre for Sustainable Technology &
Interdisciplinary Centre for Energy Research**

**Sponsored by
AICTE, NEW DELHI**



**Centre for Continuing Education
Indian Institute of Science
Bengaluru – 560 012
<http://www.cce.iisc.ernet.in>**