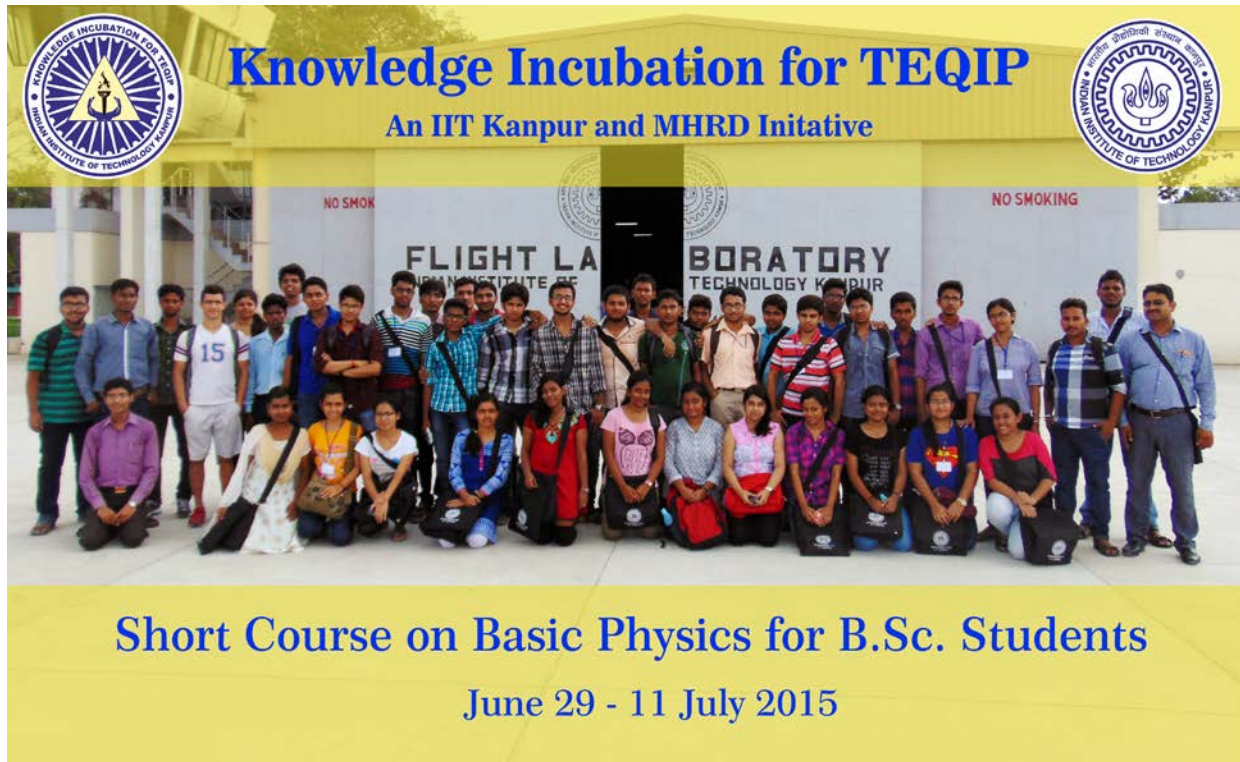




KNOWLEDGEINCUBATIONFOR TEQIP,IITKANPUR

Short Course on Basic Physics

June 29 – July 11, 2015



The university education is generally confined to the boundaries of syllabus and examinations. As a result motivation often lacks among our young students. The aim of this Course was to expose the students to the inherent beauty of Science/engineering in general and of Physics in particular. The hope was that this will trigger in them self motivation to acquire skills to become good researchers.

The 2-week course was intended to give students a flavor of Basic Physics at UG level both in experiments and in theory. It focused on deeper understanding and analysis of the phenomena and developing competence in applying the Principles in a given situation.

The program had following components:

- Lectures by working scientists, mostly from IIT Kanpur, on areas like Quantum Mechanics, Optics, and Electrodynamics.
- Experimental demonstrations.
- Short experiments were conducted.
- Lab sessions.

TopicsDiscussed

- Electrodynamics
- Basics of ion-beam physics
- EM Waves and Lasers
- Semiconductors
- Waves and acoustics
- OPTICS
- Fractals and Chaos
- Physics of early universe
- About the Sun
- Quantum World
- Speed of light
- Demonstrations
- Surgery Practices in Ancient India
- Shiksha Sopan, a social initiative
- Neutrino Katha
- NAEST Experiments
- Lab sessions with related subject

LISTOFSPEAKERS

- Dr. H.C.Verma
- Dr. MK Harbola
- Dr. Aditya Kelkar
- Dr. H Wanare
- Dr. Y. N. Mohapatra
- Dr. NachiketTiwari
- Dr. Saikat Ghosh
- Dr. Sagar Chakraborty
- Mr. Deepak Mishra
- Dr. Kaushik Bhattacharya
- Mr. Amit Bajpai
- Mr. J.P. Chaturvedi
- Mr. Anurag Pandey

PARTICIPATING INSTITUTES

TEQIP Institute	Number of Participants
Jadavpur University	27
BIT Mesra	1
Delhi University	2
Mumbai University	1
Cochin University of Science & Tech. Kalmassery, Kerela	1
I.T. College, Lucknow	1
D. G. Ruparel College Mahim Mumbai	1
CCS University Meerut	1
Jai Hind College, Mumbai Univesity	1
SCHM College Ulhas Nagar Thane	1
Nesamony Memorial, Kanyakumari (T. N.)	1
Poornaprajna College Udupi, Karnataka	1
BJB Autonomus College Bhuwneshawer	1
Fergussan College Pune	1
Patna Science College	1
PanskuraBanamali College Medinipur	2
Catholicate College PathanamthittaKerela	1
New Arts. Commerce & Sci. Co. Ahmadnagar	1
Total	46

Workshop Schedule

June 29, 2015

Time	Event
8:30 AM -09:00AM	Registration
09:00AM–10:25AM	Inauguration followed by TEA
10:35 AM–12:00PM	Introduction with participants and briefing of camp <i>Dr. H. C. Verma</i>
12:10 PM–1:10 PM	Video Quiz <i>Mr Deepak Mishra</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	NAEST Expt I Core UG Lab Prep Room <i>Mr Amit Bajpai</i>

June 30, 2015

Time	Event
9:00 AM – 10:25AM	Discussion on Video Quiz <i>Dr. H C Verma</i>
10:35 AM – 12:00 PM	Waves and acoustics <i>DrNachiketTiwary</i>
12:10 PM – 1:10 PM	Physics of early universe <i>DrKaushik Bhattacharya</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	NEAST Expt II <i>Mr Amit Bajpai</i>

July 1, 2015

Time	Event
9:00 AM – 10:25AM	Electrodynamics <i>Dr MK Harbola</i>
10:35 AM – 12:00 PM	OPTICS <i>DrSaikat Ghosh</i>
12:10 PM – 1:10 PM	OPTICS <i>DrSaikat Ghosh</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Optics Lab <i>DrSaikat Ghosh</i>

July 2, 2015

Time	Event
9:00 AM – 10:25AM	Electrodynamics <i>Dr MK Harbola</i>
10:35 AM – 12:00 PM	Waves and acoustics <i>DrNachiketaTiwary</i>
12:10 PM – 1:10 PM	Speed of light <i>Dr H C Verma</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	NAEST Expt 3 <i>MrAmit Bajpai</i>

July 3, 2015

Time	Event
9:00 AM – 10:25AM	Electrodynamics <i>Dr MK Harbola</i>
10:35 AM – 12:00 PM	Waves and acoustics <i>DrNachiketaTiwary</i>
12:10 PM – 1:10 PM	EM Waves and Lasers <i>Dr H Wanare</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Expt Activity <i>MrRanjit Kumar</i>

July 4, 2015

Time	Event
9:00 AM – 10:25AM	Quantum World <i>Dr H C Verma</i>
10:35 AM – 12:00 PM	Fractals and Chaos <i>DrSagar Chakraborty</i>
12:10 PM – 1:10 PM	EM Waves and Lasers <i>Dr H Wanare</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Ion Beam Lab visit <i>DrAdityaKelkar(L-9)</i> <i>Puzzles</i> <i>MrRanjit Kumar</i>

July 5, 2015

Time	Event
9:00 AM – 10:25AM	Basics of ion-beam physics <i>DrAdityaKelkar</i>
10:35 AM – 12:00 PM	Fractals and Chaos <i>DrSagar Chakraborty</i>
12:10 PM – 1:10 PM	Demonstrations <i>Mr Deepak Mishra</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Anveshika/Bithoor <i>MrAmitBajpai</i>

July 6, 2015

Time	Event
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9:00 AM – 10:25AM	About the Sun <i>Dr J P Chaturvedi</i>
10:35 AM – 12:00 PM	Fractals and Chaos <i>DrSagar Chakraborty</i>
12:10 PM – 1:10 PM	EM Waves and Lasers <i>Dr H Wanare</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Visit to NSI <i>MrAmitBajpai</i>

July 7, 2015

Time	Event
9:00 AM – 10:25AM	Semiconductors <i>Dr Y N Mohapatra</i>
10:35 AM – 12:00 PM	Fractals and Chaos <i>DrSagarChakraborty</i>
12:10 PM – 1:10 PM	EM Waves and Lasers <i>Dr H Wanare</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Expt Activity <i>MrRanjit Kumar</i>

July 8, 2015

Time	Event
9:00 AM – 10:25AM	Semiconductors <i>Dr Y N Mohapatra</i>
10:35 AM – 12:00 PM	OPTICS <i>DrSaikat Ghosh</i>
12:10 PM – 1:10 PM	OPTICS <i>DrSaikat Ghosh</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Optics Lab <i>DrSaikat Ghosh</i>

July 9, 2015

Time	Event
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9:00 AM – 10:25AM	Semiconductors <i>Dr Y N Mohapatra</i>
10:35 AM – 12:00 PM	ShikshaSopan, a social initiative <i>MrAnuragPandey</i>
12:10 PM – 1:10 PM	EM Waves and Lasers <i>Dr H Wanare</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Optics Lab <i>DrSaikat Ghosh</i>

July 10, 2015

Time	Event
9:00 AM – 10:25AM	Semiconductors <i>Dr Y N Mohapatra</i>
10:35 AM – 12:00 PM	Surgery Practices in Ancient India <i>Dr H C Verma</i>
12:10 PM – 1:10 PM	EM Waves and Lasers <i>Dr H Wanare</i>
1:10 PM – 2:30 PM	Lunch break
2:30 PM – 4:45 PM	Visit to Air Strip <i>Amit bajpai</i>

July 11, 2015

Time	Event
9:00 AM – 10:25AM	Semiconductors <i>Dr Y N Mohapatra</i>
10:35 AM – 12:00 PM	Neutrino Katha <i>Dr H C Verma</i>
12:10 PM – 1:10 PM	Feedback

Summary of Feedback

Total Attendance: 41

Workshop

<i>Questions</i>	<i>Excellent</i>	<i>Good</i>	<i>Ordinary</i>
Clarity of communication about workshop	21	19	01
Organization of the sessions	30	11	00
Quality of lectures	32	09	00
Quality of posters	15	25	01
Effectiveness of discussions	24	16	01
Effectiveness of learning experience	24	15	02
	<i>Appropriate</i>	<i>Short</i>	<i>long</i>
Duration of workshop	30	11	00
	<i>Definitely</i>	<i>Maybe</i>	<i>No</i>
Would you like to have more such sessions?	37	04	00
Would you like e-lectures by experts on special topics?	33	08	00
Suggest specific topic that you would like additional expert lectures on	<ul style="list-style-type: none"> • Special theory of relativity cosmology. • Astrophysics • Electrodynamics • Cosmology • Quantum Mechanics, classical statistical mechanics. • Special Theory of Relativity • Fluid Mechanics • Physics of early universe • Electrodynamics, Optics • Mechanics • Mathematical methods • About the sun, fractals, chaos • Cosmology • Classical Mechanics • Cosmology and particle physics • Electromagnetism • Black hole, anti matter • Basics on statistical and classical mechanics, general relativity. • It would prove to more effective even if lecture be provided through e-connection. This TEQIP should prove to be of long term benefit in the area of physics • EM waves 		

Additional Suggestions	<ul style="list-style-type: none"> • Organizing such more camps would help students love the subject more. • This type of courses should be organized again for B.Sc students. • More visit to factories. • The practical experiments should have to be much more interesting. • There should be some competitions among students. • There should be enough emphasis on single topic than teaching so many topics • Optics should be taught more please afford with physics book. • This type of course should be organized further for B.Sc students. • Duration of 1st class is too long. • The duration of course should be increase if possible and study materials may be supplied if possible. • Organizing more such camps for 3rd year students • There could have been some more lab sessions. • Duration of practical/ experimental class was not sufficient • No. of lectures was not sufficient • Please provide video discs for this short course for future enquiries; so that if we have doubt we can see it if you provide lecture videos
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Learning

<i>Questions</i>	<i>Yes</i>	<i>No</i>	
Do you get enough class projects?	24	17	
Is the learning adequate?	29	12	
Do you have sufficient resources for	35	06	
What is your area of specialization	<ul style="list-style-type: none"> • Theoretical physics • Electronics • Electromagnetism • Waves • Optics • Electrodynamics • Nuclear physics & Quantum Mechanics • Quantum Mechanics • Photonics • General Physics 		
	<i>Sufficient</i>	<i>inadequate</i>	
Is the library/journal support/e-connection adequate?	24	17	
	<i>Definitely</i>	<i>Maybe</i>	<i>No</i>
Would you like to have common (TEQIP) repository of course	39	02	00

Would you like to visit IITK to attend specialized courses?	41	00	00
Would you like MOOCS/e-resources based courses?	40	01	00
How can TEQIP help improve your learning?	<ul style="list-style-type: none"> • It helps us build more communication with the teachers. • TEQIP can improve our learning by showing and explaining many physical amazing facts of daily life and growing interest to the subject. • By organizing such more courses • TEQIP can improve our learning by showing and explaining many physical amazing fact of daily life and growing interest of the subject. • By organizing many such courses (but little longer) • Study material may be supplied. • By exposing us to such institutes where sufficient sources of labs available. • TEQIP will definitely increase our knowledge about physics & nature. • By conducting such short courses and encouraging us to do something scientific in career. • TEQIP can arrange such workshop again in IITk • By organizing more such camps and more innovative learning. • By involving us with more such courses and guiding us. • We would be highly benefited if we can attend IITK again and work at the laboratory and have some problem solving sessions. • By providing more exposure to practical applicability of physics. • TEQIP can organize such workshop every year. • It will actually be of great advantage to my learning. It will bring me beyond the region of examination based studies. 		

Research

<i>Questions</i>	<i>Definitely</i>	<i>Maybe</i>	<i>No</i>
Would you like to visit an IIT for a short visit /internship/post- doctoral stint ,if offered (via TEQIP)?	40	00	00
Would you like to share/use research infrastructure at IITK, if made available?	38	02	00
Would you like to conduct collaborative research with IITK faculty?	38	02	00
Would you like lectures by experts (Indian and international) on niche researchareas/topics?	35	05	00
Do you want special-topic conferences?	37	03	00

How can TEQIP help improve your research?

- Through interaction with the learned professors and experts.
- Teqip can help us grow amore inductive way of thinking and researching.
- TEQIP should increase the scopes of various research fields and provide the students with good instruments.
- I am specially interested in theoretical physics and presently in quantum decoherence and TEQP can provide some internship/ undergraduate research opportunities would be a great chance for me to study more on the subject and experience research.
- By improving ideas about research
- By motivating.
- TEQIP can organize more such courses.
- Continued access to high quality professors.
- By showing various research fields.
- By making us understand the meaning of researching
- By making us aware of the present happening around in the world.
- TEQIP can improve our research by providing us with better research facilities and improvements.
- TEQIP can increase the scopes of various research fields and provide the students necessary instruments and provide scholarship for research scholars.
- I expect more courses organized by TEQIP to motivate us.
- By arranging such camps in next year.
- By giving more internships and collaborative research for those who don't get adequate laboratory facility.
- If TEQIP arrange more such camps for 2nd & 3rd year students it would be highly beneficial.
- TEQIP can organize for some summer research projects for students like us.
- It would provide me with right information and help me to understand my subject more clearly.
- Firstly give us a chance to work as an assistant in research projects with seniors so that we can once see the research world. Secondly help is getting guidance from senior physicist.

OUTCOME

The course did fulfill its objective. The lab visits, close interaction with scientists at IITK, the connection between the Physics and their engineering applications, etc were brought out quite vividly. Students were very excited and started loving their curriculum.

Students were encouraged to formulate new problems. Short experiments were conducted and were discussed threadbare to sharpen the understanding of underlying physics and bring out how physics is involved in real life situations. In the lab visit session participants showed keen interest in visiting IITK for few weeks/months to use the lab facilities for their experiments.