When I first visited IIT Chennai in early 2009 enquiring about where they purchased their lab equipment for M.Sc. physics laboratory course, one professor referred me to Ajay Sensors kit. Our department purchased one kit in the academic year 2009-10 for which we wanted some kind of training on using the equipment. Sometime during June 2012, I requested Prof. Srinivasan if there can be some kind of training session on the usage of these kits. He informed me of the refresher courses sponsored by the Indian Academy of Sciences and that he will be free during 2013 summer. When I enquired again in April 2013, he said all the sessions have been booked till May 2014. So after discussion and permission from Principals and Dean in a HoD meeting, and in consultation with Prof. Srinivasan, dates of the course were fixed as June 16 – July 1, 2014.

The proposal was submitted to the Joint Science Education Panel, Indian Academy of Sciences, with revisions on the budgeting on 14 Nov 2013 and it was accepted on 26 Nov 2014 with an approved maximum contribution of Rs. 3,84,200/- from the Panel and a minimum contribution of Rs. 50,000 from Amrita Vishwa Vidyapeetham.

As part of the preparation and as requested by Prof. R. Srinivasan, with the approval of the Principals, and readjustment of classes, our university arranged for sending our three physics staff for training at Indian Academy of Sciences, Bangalore, during Nov 7 – Nov 23, so as to serve as resource persons for this course. The Programme flyer/Brochure was published in the journals ‘Resonance’ and ‘Current Science’ published by the Academy. Application and brochure was mailed to about 30 nearby colleges as well.

We planned to select 30 applications (the maximum allowed was 34) divided in to 15 groups with two persons in each group. Thirty two participants were selected and 25 of them registered and completed the course. Among these participants, 6 of them were our physics staff, 3
PhD scholars and Integrated MSc students of our campus, and the remaining 7 were outstation participants, of which one of them is an integrated M.Sc. student of a Physics Education Programme in Mysore.

The course started with inaugural function with the presence of Physics department chairman, Prof. V.M. Nandakumaran, a senior physics faculty Prof. Narayanan Kutty, and the Principals of the Schools of Arts & Sciences and Engineering, Prof. P.V. Ramanathan and Prof. K. San- karan. First four days were entirely dedicated to lecture sessions by resources persons introducing the experiments and the physics principles. On the remaining nine days, except for the first hour, entire day was spent on doing experiments, two per day – one in the morning session and one in the evening. All groups successfully completed all 17 sets of experiments performing all necessary calculations, plotting of results to the satisfaction of course director.

First hours of those nine days were dedicated to discussion sessions and three special lectures. Most of the discussion sessions were led by Prof. R. Srinivasan and some by Prof. Alex A.V. Of the three the special lectures first was given by Dr. Madhu Thalakulam, IISER Thiruvananthapuram, on Nanophysics, the second of these by Prof. R. Srinivasan on laser cooling, spread of two sessions, and the third by Dr. Ganesh Sundaram on Berry phases in Physics.

On the 14th and final day, the course concluded with valedictory function during which staff, students, coordinator, resources persons, course director shared their views on the course. All the participants expressed satisfaction on the campus amenities (lecture halls, laboratory, and computing facilities), course content, campus stay, and food services. The function ended with Prof. R. Srinivasan’s words of inspiration to students.

Ganesh Sundaram
Course Coordinator
## TIME TABLE

(updated)

**REGISTRATION:** 16 June 2014, 9:00 – 10:00 am. VENUE: Engineering Building Main Hall.

**INAUGURATION:** 10:00 – 11:00 am. VENUE: AMRITESHWARI Hall.

**VENUE for All Lecture Sessions:** Lecture Hall A203

**VENUE for All Laboratory Sessions:** M.Sc. Physics Lab N105

### Week 1

(L denotes lecture number)

<table>
<thead>
<tr>
<th>Day and Date</th>
<th>10:00 to 11:00 hrs</th>
<th>11:30 to 12:30 hrs</th>
<th>14:00 to 15:00 hrs</th>
<th>15:15 to 16:15 hrs</th>
<th>16:15 to 17:15 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 16 June ’14</td>
<td>Inauguration</td>
<td>RP1 (L1)</td>
<td>RP2 (L5)</td>
<td>RP1 (L2)</td>
<td>RP2 (L6)</td>
</tr>
<tr>
<td>Tuesday 17 June ’14</td>
<td>9:30 to 10:30 hrs</td>
<td>10:45 to 11:45 hrs</td>
<td>11:45 to 12:45 hrs</td>
<td>14:00 to 15:00 hrs</td>
<td>15:15 to 16:15 hrs</td>
</tr>
<tr>
<td>Wednesday 18 June ’14</td>
<td>RP3 (L9)</td>
<td>RP1 (L3)</td>
<td>RP2 (L7)</td>
<td>RP3 (L10)</td>
<td>RP1 (L4)</td>
</tr>
<tr>
<td>Thursday 19 June ’14</td>
<td>Alex (L13)</td>
<td>RP3 (L11)</td>
<td>Alex (L14)</td>
<td>RS (L18)</td>
<td>RP3 (L12)</td>
</tr>
<tr>
<td>Friday 20 June ’14</td>
<td>Alex (L15)</td>
<td>RS3 (L20)</td>
<td>Alex (L16)</td>
<td>RS (L21)</td>
<td>Alex (L17)</td>
</tr>
<tr>
<td>Saturday 21 June ’14</td>
<td>RS (L23)</td>
<td>LABORATORY</td>
<td>LABORATORY</td>
<td>LABORATORY</td>
<td>LABORATORY</td>
</tr>
<tr>
<td>Sunday 22 June ’14</td>
<td>HOLIDAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**VENUE for All Lecture Sessions:** Lecture Hall A203

**VENUE for All Laboratory Sessions:** M.Sc. Physics Lab N105

**LUNCH:** 13:00 to 14:00 hrs

**VENUE:** ANUGRAHA HALL

**COFFEE/TEA BREAK**

- 10:30 to 10:45 hrs (Except on 5 June)
- 15:00 to 15:15 hrs

Will be served outside the lecture halls or the laboratory.
### Weeks 2 & 3

<table>
<thead>
<tr>
<th>Day and Date</th>
<th>9:30 to 10:30 hrs</th>
<th>10:45 to 11:45 hrs</th>
<th>11:45 to 12:45 hrs</th>
<th>Lunch Break</th>
<th>14:00 to 15:00 hrs</th>
<th>15:15 to 16:15 hrs</th>
<th>16:15 to 17:15 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 23 June ’14</td>
<td>Discussion</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday 24 June ’14</td>
<td>Discussion</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday 25 June’14</td>
<td>SPL2</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday 26 June’14</td>
<td>SPL2 (contd)</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday 27 June ’14</td>
<td>Discussion</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday 28 June’14</td>
<td>Discussion</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday 29 June ’14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HOLIDAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monday 30 June ’14</td>
<td>SPL3</td>
<td>LABORATORY</td>
<td></td>
<td></td>
<td>LABORATORY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday 1 July ’14</td>
<td>ValedictorySession</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LECTURES

#### LECTURES by RP1 (Ms. Dhanya S.R., AVV, Kollam)

1. Signal generator and power amplifier
2. Young’s Modulus of a bar by Flexural vibration
3. Rigidity Modulus of a brass
4. Stefan’s constant and High Resistance by leakage

#### LECTURES by RP2 (Ms. Roshima N.S., AVV, Kollam)

5. Constant current source and DC differential amplifier
6. Thermal and electrical conductivity of Copper and thermal conductivity of a PoorConductor.
7. Calibration of a silicon diode and Copper constantan thermocouple against PtResistance thermometer
8. TCR of Copper and Bandgap of silicon

#### LECTURES by RP3 (Ms. Remya S. Nair, AVV, Kollam)

9. k/e using a transistor
10. AC Experiments: Impedance of an inductance, of a capacitance, Series and Parallel Resonance circuits.
11. Passive Filters
12. AC Bridges

**LECTURES BY Prof. A.V. Alex (Alex), Kalamassery**

13. Thermal Diffusivity
14. Capacitance meter – Dielectric constant of benzene and dipole moment of acetone
15. Verification of Curie Weiss Law for a ceramic capacitor
17. B-H curve

**LECTURES by R.S. (Prof. R. Srinivasan, Indian Academy of Sciences, Bengaluru)**

18. Inversion temperature of Fe-Cu thermocouple
19. Phase sensitive detection – calibration of a lock in amplifier
20. Measurement of mutual inductance and low resistance with a lock in amplifier
21. Tracing phase transition in shape memory alloy by resistance
22. Non-linear dynamics – Feigenbaum circuit
23. Non-linear dynamics – Chua circuit

**SPL1**: SINGLE ELECTRONICS by Dr. Madhu Thalkulam, Dept of Physics, IISER TVM - the basic physics of quantum dots, spin qubits, fabrication and measurement. (21-6-2014, 9:30 am)

**SPL2**: “Laser Cooling” by Prof. R. Srinivasan, Fellow of Indian Academy of Sciences, Bangalore (25-6-2014, 9:30 am)

**SPL3**: “Berry Phases in Physics” by Dr. Ganesh Sundaram, Dept of Physics, Amrita Vishwa Vidyapeetham. (30.6.14, 9:30 am)