Infectious Diseases are integral part of undergraduate and post graduate syllabi and recent developments in this area deserve focused consideration. Hence, this refresher course was aimed at providing knowledge about advances in the field of infectious diseases and hands on training in the modern biotechnological practices that are applied in diagnosis and research. The course was conducted by kind support of the Science Academies: The Indian Academy of Sciences (IAS), Bangalore; Indian National Science Academy (INSA), New Delhi and National Academy of Sciences, India (NASI), Allahabad.

Total 20 candidates were selected for the Course from a large number who responded to the announcement appeared in the issue of Current Science (10th July 2013), on the website of the Haffkine Institute (HI) and also to e-mails sent to different colleges and universities, all over the country. However, 3 candidates could not attend the Refresher Course. Twelve outstation candidates from various parts of the country and five local candidates participated in the Course (Appendix 1). Accommodation was arranged for the outstation candidates in the ICMR International Hostel at Worli, Mumbai. During the Course, to and fro transport was provided to these participants. Suitable arrangements were made for boarding. All the candidates were provided with tea/coffee, lunch and snacks during the sessions on the venue.

The program covered various aspects of infectious diseases including virology, bacteriology, parasitology, zoonotic infections and advanced technologies such as Microarray, FISH, Flow cytometry, DNA sequencing, Confocal Microscopy, Transmission Electron Microscopy (TEM) etc. (Appendix 2). The faculty consisted of eminent scientists and clinicians from all over the country (Appendix 3). Practical sessions were conducted at Haffkine Institute (HI), National Institute for Research in Reproductive Health (NIRRH), Tata Memorial Hospital (TMH) and Sophia College. Each practical session was coordinated by an in-house faculty member and was comprised of demonstrations and hands-on training (Appendix 2). Each participant was provided with an experimental kit containing apron, masks, shoe covers, permanent markers and writing material. A file (bound form is enclosed) which contained programme of the Course, abstracts and standard operating protocols (SOP) was given to all the participants. The file was open ended and additional material was included as the course progressed. A DVD containing soft copy of the ‘file’ reference material, power-point presentations from the speakers and other material provided by the faculty members was also given to the participants at the end of the course.

The Refresher Course was inaugurated on 22nd September 2013 by Padma Bhushan Dr. R. D. Lele, Chairman - Advisory Council for Research of the Haffkine Institute. The inaugural session started with a brief welcome by Dr. Abhay Chowdhary, Director, Haffkine Institute. Dr. Tarala Nandedkar (Course Director) spoke about the Academies and gave overview of the Course to the candidates. The inaugural function was followed by a plenary talk on “Trends in Vaccinology” by Padma Shri Dr. Madhav Deo. The function was concluded with vote of thanks by Dr. Nishigandha Naik (Course Coordinator).
The first academic module was on virology. It started with an introduction to basic virology and covered topics related to HIV, Influenza virus, Viral Hepatitis and Dengue. Talks on HIV were by Dr. Robin Mukhopadhyay and Dr Ramesh Paranjpe while those on viral hepatitis and H1N1 were given by Dr Kanjaksha Ghosh and Dr Abhay Chowdhary, respectively. Since the focus of the Course was infectious diseases, the first practical session included demonstrations and discussion on Biosafety precautions while handling infectious agents. This was conducted by Mr. Sandeepan Mukherjee which was further elaborated by Dr. Arunkumar (Manipal University) in his informative talk. The hands-on session was initiated with molecular biology techniques such as Real time PCR and Reverse Transcriptase (RT) PCR used in diagnosis of viral diseases, which was conducted by Dr. Ritwik Dahake (HI). This involved each participant conducting PCR experiments for the human GAPDH gene and analyzing the results by individually doing gel electrophoresis and recording by gel documentation. These practical were found to be very useful by the participants. Demonstration of Real Time PCR was carried out wherein the participants were shown how to set up a Real Time PCR reaction and analyze results. Both, the TaqMan (detection of Influenza and Pandemic H1N1 Influenza) and SYBR Green Chemistry (Cytokine Gene Expression) assays and quantitation using standards (HIV Viral Load) were shown. On request of the participants, a special session on primer designing was conducted by Dr. Dahake which was appreciated greatly by the participants. The second hands-on session in virology conducted by Dr. Sweta Kothari included isolation of PBMCs from peripheral blood samples for cultivation of HIV and ELISA for diagnosis of HIV.

In the module dealing with advanced technologies, Dr. Pratibha Amre (TMH) introduced the participants to Fluorogenic in Situ Hybridization (FISH) and Chromogenic in Situ Hybridization (CISH) through her talk and demonstration at TMH. Preparation of slides and interpretation of the data with the help of computer-aided software was demonstrated. A very enlightening set of sessions using state of art technology conducted at NIRRH added a new dimension. This session included advanced techniques like 2D Gel Electrophoresis, High Performance Liquid Chromatography (HPLC), peptide synthesis, DNA sequencing and Microarray. The sessions were conducted by Dr. Geetanjli Sachadeva and Dr. Deepak Modi. Dr. Modi also introduced the field of “Transgenics” in his elaborative talk. Talk on “Protein Chemistry & Techniques of Molecular Separations” was delivered by Dr. Smita Mahale (NIRRH). The module also included talks on microscopy and flow cytometry by Dr. Nafisa Balasinor (NIRRH) and Dr. Shraboni Mukherjee (NIRRH), respectively. A part of this aspect was continued in NIRRH as demonstration of confocal microscopy and flow cytometry. Additionally, Dr. Dipti Singh (NIRRH) introduced the field of electron microscopy, whereas Dr. Anil Bobade (HI) and his colleagues from the Chemotherapy Department briefed and demonstrated applications of IR and GC-MS. The entire module was well appreciated by the participants.

On the World Rabies Day, that is, September 28th, the candidates performed Fluorescence Antibody Test (FAT) for Rabies under the guidance of Ms. Shraddha Mehta. Brain samples harvested from mice inoculated with standard challenge virus strain were used as positive controls and normal mouse brain was used as negative control. The participants prepared brain smears using touch impression tissue method and carried out FAT after fixing the smears. A long laboratory session conducted by Mr. Sandeepan Mukherjee included hands-on experiments like In Ovo Cultivation (candling of embryonated eggs and inoculation of sample), animal handling and inoculation. Each participant inoculated sample
dye in Chorio Allantoic Membrane (CAM). The participants were also encouraged to handle laboratory animals especially for inoculation at various sites (IP, SC, IM, IV etc.) and collection of blood through retro-orbital route. Dr. Devendra Choudhary (Haffkine Biopharmaceuticals Ltd.) enlightened important aspects of Animal House Facility in his talk. The Course included 2 visits. One was at the animal house and primate facility of the NIRRH under the guidance of Dr. Uddhav Choudhary, wherein, the participants observed various animal models such as Swiss mice, BALB/c mice, Holtzman rats, Belgium rabbits, Bonnet monkeys and marmoset monkeys to name a few. Another visit was to the Serpentarium of the HI where, the participants had opportunity to see different types of poisonous and non-poisonous snakes, milking of Cobra etc. Copies of the book, ‘Snakes and Scorpions of India’ published by the HI were given to the participants.

In a thought provoking session in parasitology module, talks by Dr. Utpal Tatu (IISc) on “Heat Shock Proteins as drug targets against Malaria”, “Trypanosomoses” and “Giardia lamblia” were very well received by the participants. This was followed by laboratory session that included Identification & Breeding of Mosquitoes, Larvicidal Oil Assay, In vitro cultivation of Plasmodium falciparum and Identification of the parasite using Field’s staining method. The practical session was conducted by Dr. Meera Ramiya in the Department of Zoonosis (HI).

In bacteriology module, important aspects of “Tuberculosis” (TB) were covered by Dr. Camilla Rodrigues (Hinduja Hospital) and Dr. Sangita Mukhopadhyay (CDFD). A practical aspect of this was continued in the Clinical Pathology Department (HI). It included demonstrations for preparation of L. J. Medium, Acid fast staining of TB bacilli, Culturing of TB bacilli, Drug Sensitivity Testing (DST), Microscopic Observation of Drug Susceptibility (MODS) and diagnostic PCR for TB using drug susceptible M. Tubercle strain H37RV. The participants were also delighted to have an interactive session with Dr. Abhay Chowdhary (HI) on “Nosocomial Infections & Control” and “Fungal infections”. In one of the sessions, Dr. Jayanti Pramanik (NIRRH) talked on “Reproductive Tract Infections”. She covered aspects related to infections caused by Human Papilloma virus (HPV), Candida albicans & Chlamydia trachomatis etc. This was followed by practical session wherein, qualitative PCR for HPV & Chlamydia were demonstrated using DNA isolated from blood and cervical swab samples.

On the 2nd October, that is, “Birth Anniversary of Mahatma Gandhi” the participants visited Manibhavan which was the focal point of Mahatma Gandhi’s political activities in Mumbai between 1917 and 1934 and now converted into Mahatma Gandhi’s Memorial that has a museum and reference library. They also enjoyed a city-tour “Mumbai Darshan” in the evening. All this added to the cultural richness of the course.

On this day session on simple and novel research model systems such as zebrafish, C. elegans and Drosophila was organized in the Life Science department of Sophia College for Women, Mumbai. A daylong session included overview on Ceanorhabditis elegans and Drosophila and their use as models for neurodegenerative diseases. This was followed by demonstration and hands-on training on Chunking of C. elegans, transferring of Drosophila, Olfactory assay & Locomotory assay using Drosophila as model system etc., which were conducted by Dr. Sree Kumar and Dr. Hema Subramaniam, respectively. An equally exciting session was conducted by Dr. Yasmin Khan on
maintenance and neurobiology of Zebrafish, a novel system, for all the participants. The new and complex science of cognitive neurobiology was discussed by Dr. Hema Ramamchandran very lucidly. She also demonstrated how these protocols can actually be utilized using stroop effect test (Cog lab software version 2). The participants seemed to enjoy these sessions as they themselves were subject of study.

Talks on “Bioinformatics” and “Nanomedicine” were given by Mr. Karthik Kalyan (HI) and Dr. Tarala Nandedkar (HI), respectively, where they stressed the significance and applications of these novel methodologies to tackle infectious diseases. Dr. Sanjiva Kholkute (NIRRH) gave an overview on how to write a scientific paper or manuscript. The participants were encouraged to form groups and prepare small projects. One afternoon session was dedicated to project presentation by participants. Five project proposals were presented by groups of participants (Appendix 4). These proposals were evaluated by a team of senior scientists comprising Dr. Smita Mahale (NIRRH), Dr. Tarala Nandedkar (HI) and Dr. Nishigandha Naik (HI), who gave insightful suggestions.

The concluding module was a panel discussion on “Biology of Infectious Diseases”. The session was moderated by Dr. Rohini Kelkar (TMH). Discussion included topics such as Host defense mechanisms, Virulence factors, HIV, Malaria and Role of pharmaceutical industry in the drug discovery with respect to infectious diseases. The eminent panelists shared their knowledge and views. The panel discussion was followed by the valedictory function. In the valedictory function, Dr. Tarala Nandedkar and Dr. Abhay Choudhary addressed the participants, while Dr. Nishigandha Naik summarized feed-back received from the participants. A representative of the participants complemented and thanked the organizers and the faculty for the Course. Participation certificates were presented to the participants along with the DVD of the study material. The refresher course was concluded with a valedictory function.

The Course has culminated in the formation of study groups and the participants have created a blog, “Biology of Diseases’ to offer a platform for interactions in the field of biology at various levels. It appears that the Refresher Course was cherished and served its purpose of updating teachers about different aspects of infectious diseases.
## Appendix 1

### List of Participants

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Title</th>
<th>Name</th>
<th>Designation</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>1</td>
<td>Dr.</td>
<td>Mamidala Estari</td>
<td>Assistant Professor</td>
<td>Kakatiya University</td>
<td>Metabolic Disorders &amp; Infectious Diseases Research Lab, Department of Zoology, Kakatiya University, Warangal 506009</td>
<td>09848309231, 08702461430</td>
<td><a href="mailto:estari08@gmail.com">estari08@gmail.com</a></td>
</tr>
<tr>
<td>2</td>
<td>Dr.</td>
<td>Nandita Baxi</td>
<td>Assistant Professor</td>
<td>M S University of Baroda</td>
<td>Department of Microbiology and Biotechnology Centre, Faculty of Science, Maharaja Sayajirao University, Vadodara 390002</td>
<td>09426922622</td>
<td><a href="mailto:nanditabaxi@yahoo.com">nanditabaxi@yahoo.com</a></td>
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<tr>
<td>3</td>
<td>Dr.</td>
<td>Vijay Omprakash Kothari</td>
<td>Assistant Professor</td>
<td>Nirma University, Ahmedabad</td>
<td>Inst. of Science, Sarkhej-Gandhinagar Highway, Chandodia, Gota, Ahmedabad 382481</td>
<td>07922868679, 09998365230</td>
<td><a href="mailto:vijay23112004@yahoo.co.in">vijay23112004@yahoo.co.in</a>; <a href="mailto:vijay.kothari@nirmauni.ac.in">vijay.kothari@nirmauni.ac.in</a></td>
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<td>4</td>
<td>Dr.</td>
<td>Himanshu Bhimani</td>
<td>Assistant Professor</td>
<td>Saurashtra University, Rajkot</td>
<td>Smt. U. B. Bhagat Science Mahila College, Gajera Saikshnik Sankul, Chakkargarh Road, Amreli 365601</td>
<td>09824440540</td>
<td><a href="mailto:himanshubhimani@gmail.com">himanshubhimani@gmail.com</a>; <a href="mailto:himanshu_bhimani@yahoo.com">himanshu_bhimani@yahoo.com</a></td>
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<td>5</td>
<td>Dr.</td>
<td>Manohar G. Pattar</td>
<td>Lecturer</td>
<td>Karnataka University Dharwad</td>
<td>Department of Microbiology Karnataka Science college Dharwad 580003, Karnataka</td>
<td>08105214217</td>
<td><a href="mailto:pgmanohar@gmail.com">pgmanohar@gmail.com</a></td>
</tr>
<tr>
<td>6</td>
<td>Ms.</td>
<td>Thangjam Rubee Chanu</td>
<td>Tutor</td>
<td>Gujarat Adani Institute of Medical Sciences, Bhuj</td>
<td>Dept. of Microbiology, Gujarat Adani Institute of Medical Sciences, GKH, Bhuj 370001</td>
<td>09662665237</td>
<td><a href="mailto:rubeethangjam03@gmail.com">rubeethangjam03@gmail.com</a></td>
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<td>7</td>
<td>Dr.</td>
<td>J. John Prabakaran</td>
<td>Assistant Professor</td>
<td>KSR College of Arts &amp; Science (Autonomous)</td>
<td>Dept of Biotechnology, KSR College of Arts &amp; Science (Autonomous) Tiruchengode, Namakkal Dt, Tamil Nadu, India. 637215</td>
<td>09443695610</td>
<td><a href="mailto:jjohnprabakaran2005@gmail.com">jjohnprabakaran2005@gmail.com</a>; <a href="mailto:drijohnprabakaran@rediffmail.com">drijohnprabakaran@rediffmail.com</a></td>
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<tr>
<td>8</td>
<td>Ms.</td>
<td>Nidhi Agarwal</td>
<td>Assistant Professor</td>
<td>Jiwaji University, Gwalior</td>
<td>Institute of Allied Science and Computer Application” ITM University, N.H. - 75, Jhansi road, Gwalior 474001</td>
<td>09907714363; 07512426045</td>
<td><a href="mailto:nidhi.agarwal112@gmail.com">nidhi.agarwal112@gmail.com</a></td>
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<tr>
<td>9</td>
<td>Dr.</td>
<td>Saif Hameed</td>
<td>Senior Lecturer</td>
<td>Amity University</td>
<td>Amity Institute of Biotechnology, Haryana, Gurgaon (Manesar) - 122413</td>
<td>09891225239, 09650040147, 0124-2337015 Ext: 1205</td>
<td><a href="mailto:saifhameed@yahoo.co.in">saifhameed@yahoo.co.in</a>; <a href="mailto:shameed@ggn.amity.edu">shameed@ggn.amity.edu</a></td>
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<tr>
<td>10</td>
<td>Dr.</td>
<td>Pande Gajanan Sukhdeo</td>
<td>Assistant Professor</td>
<td>University of Pune</td>
<td>Dept. of Zoology, B.P.H.E. Society’s Ahmednagar College, Ahmednagar 414001, Maharashtra</td>
<td>09403629157, 0241-2429157</td>
<td><a href="mailto:pande_7777777@rediffmail.com">pande_7777777@rediffmail.com</a></td>
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<tr>
<td>11</td>
<td>Dr.</td>
<td>E.G.Tiru Venkata Kumar</td>
<td>Lecturer</td>
<td>S.V.University, Tirupati</td>
<td>Department of Endocrinology &amp; metabolism, Sri Venkateswara Institute of Medical Sciences, Tirupati 517507</td>
<td>08772287777 extn. 2312, 2323, 2315 08772241027 09441492473</td>
<td><a href="mailto:egtvkumar@gmail.com">egtvkumar@gmail.com</a></td>
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<td>12</td>
<td>Dr.</td>
<td>M. Radhakrishna</td>
<td>Assistant Professor</td>
<td>University College of Science Siafabad</td>
<td>Department of Zoology University College of Science Siafabad, Osmania University Hyderabad 500004</td>
<td>09908316511</td>
<td><a href="mailto:muttinenirk@gmail.com">muttinenirk@gmail.com</a></td>
</tr>
<tr>
<td>13</td>
<td>Dr.</td>
<td>Jayaprada Rao Chunduri</td>
<td>Assistant Professor</td>
<td>University of Mumbai</td>
<td>Biotechnology Dept., Mithibai College,Vile Parle (W), Mumbai 400056</td>
<td>02228206646, 9820306830</td>
<td><a href="mailto:jayaprada_chunduri@hotmail.com">jayaprada_chunduri@hotmail.com</a>; <a href="mailto:jsowri@rediffmail.com">jsowri@rediffmail.com</a></td>
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<td>14</td>
<td>Dr.</td>
<td>Jyoti Tope</td>
<td>Assistant Professor</td>
<td>Padma Shri Dr D Y Patil University, Department of Biotechnology and Bioinformatics, Serton-15, Plot-50, CBD Belapur, Navi Mumbai</td>
<td>09930191657, 02227795667</td>
<td><a href="mailto:jyotitope8@gmail.com">jyotitope8@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Dr.</td>
<td>Rajbinder Kaur Dehiya</td>
<td>Assistant Professor</td>
<td>Department of Microbiology, Sophia College, Bhulabhai Desai Road, Mumbai 400 026.</td>
<td>02223523304/02223512642 Ext 224, 09969011576</td>
<td><a href="mailto:rajbinder_d@rediffmail.com">rajbinder_d@rediffmail.com</a></td>
<td></td>
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<tr>
<td>16</td>
<td>Mr.</td>
<td>Aashutosh Arvind Shubhada Mule</td>
<td>CHB Lecturer</td>
<td>University Department of Biophysics, University of Mumbai and St. Xaviers College (Autonomous), Fort, Mumbai</td>
<td>Dept of Virology, Haffkine Institute for Training, Research &amp; Testing, Acharya Donde Marg, Parel, Mumbai 400012</td>
<td>09892983077</td>
<td><a href="mailto:aashutosh.mule@gmail.com">aashutosh.mule@gmail.com</a></td>
</tr>
<tr>
<td>17</td>
<td>Mr.</td>
<td>Lalit samant</td>
<td>CHB Lecturer</td>
<td>Department of Bioanalytical Science Karmaveer Bhaurao Patil College Sector 15 A, Vashi, Navi Mumbai 400703</td>
<td>Dept of Virology, Haffkine Institute for Training, Research &amp; Testing, Acharya Donde Marg, Parel, Mumbai 400012</td>
<td>09172300601</td>
<td><a href="mailto:samantlalit@gmail.com">samantlalit@gmail.com</a></td>
</tr>
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</table>
Appendix 2

Programme of the Refresher Course

Day 1 - September 22, 2013; Sunday
4.00 pm – 5.00 pm Registration
5.00 pm – 6.00 pm Inaugural ceremony
6 pm – 7 pm Plenary talk – Trends in Vaccinology Padma Shri Dr. Madhav Deo, MAMB
7.30 pm Dinner

Day 2 - September 23, 2013; Monday
9.30 am – 10.30 am HIV Dr. Robin Mukhopadhyaya, ACTREC
10.30 am – 11.00 am Tea
11.00 am – 12.00 noon Immunology and vaccines Dr. R. S. Paranjape, NARI
12.00 noon – 1.00 pm H1N1 Dr. Abhay Chowdhary, HI
1.00 pm – 2.00 pm Lunch
2.00 pm – 5.30 pm Demonstration - Biosafety Mr. Sandeepan Mukherjee, HI
Practicals - RT-PCR and QPCR Dr. Ritwik Dahake, HI

Day 3 - September 24, 2013; Tuesday
9.30 am – 1.00 pm Practicals - HIV cell culture & Dr. Sweta Kothari, HI
ELISA
1.00 pm – 2.00 pm Lunch
2.00 pm – 3.00 pm Diagnostic virology Dr. G. Arun Kumar, Manipal University
3.00 pm – 4.00 pm Influenza – Diagnostics and
molecular epidemiology
4.00 pm – 4.30 pm Tea
4.30 pm – 5.30 pm Biosafety and accreditation
of laboratory

Day 4 - September 25, 2013; Wednesday
9.30 am – 10.30 am Hepatitis Dr. Kanjaksha Ghosh, IIH
10.30 am – 11.00 am Tea
11.00 am – 12.00 am Dengue Dr. Abhay Chowdhary, HI
12.00 – 12.30 pm Project presentation – Dr. Tarala Nandedkar
Discussion
12.30 pm – 1.30 pm Lunch
1.30 pm – 2.30 pm FISH Dr. Pratibha Amre, TMH
2.30 pm – 5.00 pm Demonstrations – FISH
### Day 5 - September 26, 2013; Thursday

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<th>Presenter</th>
<th>Location</th>
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<tr>
<td>9.30 am – 11.45 am</td>
<td>Demonstrations – Protein chemistry, DNA sequencing, Microarray</td>
<td>Dr. Geetanjali, Dr. Srabani Mukherjee, Dr. Deepak Modi</td>
<td>NIRRH</td>
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<tr>
<td>12.00 noon – 1.00 pm</td>
<td>Transgenics</td>
<td>Dr. Deepak Modi</td>
<td>NIRRH</td>
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<td>1.00 pm – 2.00 pm</td>
<td>Lunch</td>
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<td>2.00 pm – 5.00 pm</td>
<td>Demonstrations – Proteomics, Protein chemistry, Microarray, and DNA sequencing</td>
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### Day 6 - September 27, 2013; Friday

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<tr>
<td>9.30 am – 10.30 am</td>
<td>TEM</td>
<td>Dr. Dipti Singh</td>
<td>NIRRH</td>
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<tr>
<td>10.30 am – 11.00 am</td>
<td>Tea</td>
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<tr>
<td>11.00 am – 12.00 noon</td>
<td>Laser Confocal Microscopy</td>
<td>Dr. Nafisa Balasinor</td>
<td>NIRRH</td>
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<tr>
<td>12.00 noon – 1.00 pm</td>
<td>Flow Cytometry</td>
<td>Dr. Srabani Mukherjee</td>
<td>NIRRH</td>
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<tr>
<td>1.00 pm – 2.00 pm</td>
<td>Lunch</td>
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<tr>
<td>2.00 pm – 5.00 pm</td>
<td>Demonstrations – TEM, Laser Confocal Microscopy, and Flow Cytometry</td>
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<td>NIRRH</td>
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### Day 7 - September 28, 2013; Saturday

**World Rabies’ Day**

<table>
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<tr>
<td>9.30 am – 10.30 am</td>
<td>Fungal Infections</td>
<td>Dr. Abhay Chowdhary</td>
<td>HI</td>
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<tr>
<td>10.30 am – 11.00 am</td>
<td>Tea</td>
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<tr>
<td>11.00 am – 12.00 am</td>
<td>Animal house facility</td>
<td>Dr. Devendra Choudhari</td>
<td>HBPL</td>
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<tr>
<td>12.00 noon – 1.00 pm</td>
<td>Practical - <em>In ovo</em> inoculation</td>
<td>Mr. Sandeepan Mukherjee, Mr. Sahil Kulkarni</td>
<td>HI</td>
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<tr>
<td>1.00 pm – 2.00 pm</td>
<td>Lunch</td>
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<tr>
<td>2.00 pm – 6.00 pm</td>
<td>Practical - Animal handling and immunofluorescence assays for rabies</td>
<td>Ms. Shraddha Mehta</td>
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### Day 8 - September 29, 2013; Sunday - Holiday

### Day 9 - September 30, 2013; Monday

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<th>Presenter</th>
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<tr>
<td>9.30 am – 10.30 am</td>
<td>Heat shock proteins as drug targets against malaria</td>
<td>Dr. Utpal Tatu</td>
<td>IISc</td>
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<td>10.30 am – 11.00 am</td>
<td>Tea</td>
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Day 9 - September 30, 2013; Monday
11.00 am – Diagnosis and treatment of neglected diseases: A case study with animal trypanosomoses
12.00 noon – Revealing secrets of biology through studies on neglected diseases: Discovery of a novel trans-splicing event in *Giardia lamblia*  
Dr. Utpal Tatu, IISc

12.00 noon – 1.00 pm Lunch

1.00 pm – 2.00 pm Practical - Mosquito larvae identification and collection, malaria parasite culturing and identification by staining  
Dr. Meera Ramiya, HI

Day 10 – October 1, 2013; Tuesday
9.30 am – 10.30 am Tuberculosis  
Dr. Camilla Rodrigues, Hinduja Hospital

10.30 am – 11.00 am Tea

11.00 am – 12.00 noon Tuberculosis - Immunology  
Dr. Mukhopadhyay Sangita, CDFD

12.00 am – 1.00 noon Nosocomial Infections  
Dr. Abhay Chowdhary, HI

1.00 pm – 2.00 pm Lunch

2.00 pm – 5.00 pm Practical – TB Diagnostics - Culture, microscopic and PCR  
Dr. Shashikant Vaidya, HI

Day 11– October 2, 2013; Wednesday
8.45 am  Start for Manibhavan

9.30 am – 10.30 am Tour to Manibhavan

11.00 am – 5.00 pm Invertebrate Research Model Systems
Sophia College for Women

Dr. Medha Rajadhyaksha – Coordinator for the day’s scientific activity

11.00 am – 12.30 am Welcome & General Introduction  
Dr. Medha Rajadhyaksha

Lab sessions on *C. elegans*  
Dr. Sree Kumar

12.30 pm – 1.00 pm Lunch

1.00 pm – 2.30 pm Introduction to Cognitive Sciences  
Dr. Hema Ramachandran

Lab session on Cognitive Sciences

2.30 pm - 3.45 pm Introduction to Drosophila  
Dr. Hema Subramaniam

Lab session on Drosophila

3.45 pm – 5.00pm Introduction to Zebra fish  
Dr. Yasmin Khan

Lab session on Zebra fish

5.30 pm – 7.30 pm Mumbai Darshan
Day 12 – October 3, 2013; Thursday
9.30 am – 10.30 am Reproductive tract infections Dr. Jayanti Pramanik, NIRRH
10.30 am – 10.45 am Tea
11.00 noon – 1.00 pm Demonstrations - Diagnosis of Chlamydia Dr. Jayanti Pramanik, NIRRH
Visit to animal house and primate facility Dr. Uddhav Chaudhari, NIRRH
1.00 pm – 2.00 pm Lunch
2.00 pm – 3.00 pm Protein Chemistry Dr. Smita Mahale, NIRRH
3.00 pm - 5.00 pm Visit to Snake Farm HI

Day 13 – October 4, 2013; Friday
8.30 am- 9.30 am Bioinformatics Mr. Karthik Kalyan, HI
9.30 am – 10.30 am Nano-medicine Dr. Tarala Nandedkar, HI
10.30 am – 11.00 am Tea
11.00 am – 12.00 noon Scientific writing & Fund raising Dr. S. D. Kholkute, NIRRH
12.00 noon – 12.30 pm Discussion
12.30 pm – 1.30 pm Lunch
1.30 pm – 5.00 pm Project presentation by participants

Day 14 – October 5, 2013; Saturday
10.00 am – 10.30 am Tea
10.30 am – 12.00 pm Panel Discussion Moderator - Dr. Rohini Kelkar, TMH
Panelists – Dr. Abhay Chaudhary, HI
Dr. Rosalind Marita, HI
Dr. Swati Patankar, IIT
Dr. Vainav Patel, NIRRH
12.00 pm – 1.00 pm Valedictory Function
1.00 pm – 2.00 pm Lunch

Adieu!
Appendix 3

List of Faculty Members

Dr. Amre Pratibha, Tata memorial Hospital, Mumbai
Dr. Arunkumar G., Manipal University, Manipal
Dr. Balasinor Nafisa, National Institute for Research in Reproductive Health, Mumbai
Dr. Bobade Anil, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Choudhari Devendra, Haffkine Bio-Pharmaceutical Corp. Ltd., Mumbai
Dr. Chowdhary Abhay, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Dahake Ritwik, Haffkine Institute for Training, Research and Testing, Mumbai

Padma Shri Dr. Deo Madhav, FNA, FASc, Moving Academy of Medicine and Biomedicine, Pune
Dr. Ghosh Kanjaksha, National Institute of Immunohaematology, Mumbai
Mr. Kalyan Karthik, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Kelkar Rohini, Tata Memorial Hospital, Mumbai
Dr. Khan Yasmin, Sophia College for Women, Mumbai
Dr. Kholkute Sanjiva, National Institute for Research in Reproductive Health, Mumbai
Dr. Kothari Sweta, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Kumar Sree, Sophia College for Women, Mumbai
Dr. Mahale Smita, FNA, National Institute for Research in Reproductive Health, Mumbai
Dr. Marita Rosalind, Haffkine Institute for Training, Research and Testing, Mumbai
Ms. Mehta Shraddha, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Modi Deepak, National Institute for Research in Reproductive Health, Mumbai
Mr. Mukherjee Sandeep, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Mukherjee Srabani, National Institute for Research in Reproductive Health, Mumbai
Dr. Mukhopadhyaya Robin, Independent, Navi Mumbai
Dr. Mukhopadhyay Sangita, FNAS, Center for DNA Fingerprinting and Diagnostics, Hyderabad
Dr. Nandedkar Tarala, FNAS, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Paranjape Ramesh, National AIDS Research Institute, Pune
Dr. Patankar Swati, Indian Institute of Technology Bombay, Mumbai

Dr. Patel Vainav, National Institute for Research in Reproductive Health, Mumbai
Dr. Pramanik Jayanti, National Institute for Research in Reproductive Health, Mumbai
Dr. Rajadhyaksha Medha, Sophia College for Women, Mumbai
Dr. Ramchandran Hema, Sophia College for Women, Mumbai
Dr. Ramiya Mira, Haffkine Institute for Training, Research and Testing, Mumbai
Dr. Rodrigues Camilla, P.D. Hinduja National Hospital, Mumbai
Dr. Sachadeva Geetanjali, National Institute for Research in Reproductive Health, Mumbai
Dr. Subramaniam Hema, Sophia College for Women, Mumbai
Dr. Tatu Utpal, FASc, Indian Institute of Science, Bangalore
Participants, Coordinator and Director of the Refresher Course with the Panelists
Glimpses of The Refresher Course

Padma Shri Dr. Madhav G Deo delivering plenary talk
‘Trends in Vaccinology’
Participants engrossed in observing demonstration of ‘Biosafety Practices’ and enthusiastically volunteered as a model.
Participants are keenly observing ‘in ovo’ inoculation
The World Rabies Day is being observed by doing FAT for rabies’ diagnosis
Excited participants are learning mice handling for inoculation experiments
Participants in training session of invertebrate model system - Drosophila
Participants busy in self evaluation by doing cognition tests