

## Technical Report

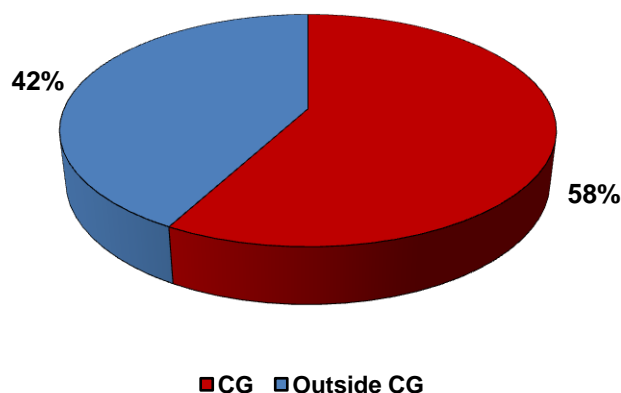
### Refresher Course in Life Science “with Special Reference to Emerging Trends and Challenges in Life Sciences”

Human Resource Development Centre, Pandit Ravishankar Shukla University, Raipur

December 3-16, 2019

Human Resource Development Centre (HRDC), Pandit Ravishankar Shukla University (PRSU), Raipur, organized the “Refresher Course in Life Science with Special Reference to Emerging Trends and Challenges in Life Sciences” from 3-16 December 2019.

Thirty eight (38) participants attended the Course, out of which sixteen (16) were from outside the Chhattisgarh, notably from Maharashtra, Madhya Pradesh, West Bengal, Uttar Pradesh, and Manipur (Figure-1). Of the twenty (20) resource persons, nine were from outside (Indore - 1, Berhampur - 1, Delhi – 1, Gwalior – 1, Bhubaneswar – 2, Bilaspur – 1, Varanasi – 1, and Sambalpur - 1). Eleven resource persons were from various institutions of Raipur city.



**Figure-1: Percentage of participants from outside the Chhattisgarh (CG) and from the Chhattisgarh (CG)**

The activity of the Course included thematic lectures (90 minutes each including 30 minutes for discussion and interaction) by resource persons every day. Each day was divided into four sessions. In general, the first two sessions were dedicated for lectures and the last two sessions for other activities, such as microteaching, seminar, project, demonstration of advanced equipments facilities, etc.

The objectives of this Course were to provide the participants with opportunities and resources for their professional and personal enrichment. It helped participants to strengthen their knowledge and encouraged them to initiate fruitful collaborative relationships among themselves and with scholarly resource persons.

## **Week-1 (December 3-9, 2019)**

### **Day 1**

On the 1<sup>st</sup> day (3.12.2019), the Course started with the registration of the participants. The 1<sup>st</sup> session was informal inaugural session followed by the introduction and interaction of the participants with the Director, Prof. A.K. Gupta, course coordinator, Prof. Arti Parganiha; and the faculty members, HRDC, Dr. Arvind Agrawal and Dr. Brijendra Pandey. Prof. A.K. Gupta welcomed all the participants on behalf of the HRDC, Pt. Ravishankar Shukla University, Raipur. He expressed his views on the importance of the course. He also emphasized about the rules & regulations, discipline, and time-management, which were to be obligatorily honoured by each participant. Prof. Arti Parganiha, course coordinator gave a brief introduction about the Course using the power point presentation and made the participants aware of the entire schedule of the Course and the assignments they were required to carry out during the period of the Course. She also informed the participants about various components/ aspects of the Course. Dr. Arvind Agrawal also addressed the participants.

Lecture session was started after a tea break. The 1<sup>st</sup> lecture was delivered by Dr. S. Verulkar, Indira Gandhi Agriculture University, Raipur on the topic “DNA based markers and its application.” He explained about the common molecular markers and their applications. He focused on practical use of DNA markers, hybrid culture in plants and finger printing techniques in human. Dr. Minakshi Sinha, AIIMS, Raipur delivered the second lecture on “Chronopatterns of metabolic diseases: trends and challenges.” She described the importance of time management in daily life. The adverse effect of modern life style on human health was main point of her talk. She explained how the circadian disruption causes serious health threats to mankind in the form of metabolic syndrome, comprising of cumulative cardio-metabolic risk exerted by abdominal obesity, hyperglycemia, high triglyceride, low HDL cholesterol, & hypertension that eventually lead the increased risks of diabetes, cardiovascular diseases, and some types of cancer. She highlighted the significance of chronotherapy, i.e., time dependent treatment of pathological symptoms, which has emerged as potential and effective clinical branch in recent times. Prof. Vibhuti Rai delivered his talk on the “Regulation of carbohydrate metabolism.” He talked about the anabolism, catabolism and amphibolism. He focused on enzymatic regulation of glycolysis, gluconeogenesis, TCA cycle, etc. The chairperson of the day was Dr. Shashi Gupta. She introduced all the speakers to the participants and expressed vote of thanks. Reporters of the day were Dr. Richa Tikariha and Dr. Mrigendra Kumar Dwivedi.

### **Day 2**

On 4<sup>th</sup> December 2019, Prof. Mitashri Mitra, SoS in Regional Studies, PRSU, Raipur, delivered her lecture on “Genetic polymorphism associated with Cancer.” She described about the polymorphism, mutation, carcinogenic hazards, leukoplakia etc. She informed that more than

90% of the diseases are due to the effects of environments and an individual may become susceptible to the environment due to presence of polymorphic alleles of genes. She suggested that the knowledge of prevalence of polymorphic allele in a population could be used for counselling to avoid environment responsible for a disease. The second lecture of the day was delivered by Prof. M.L. Naik (Rtd. Prof.), SoS in Life Science, PRSU, Raipur on the topic 'Biodiversity.' Prof. Naik discussed about the first antibiotic lysozyme, which was discovered by Alexander Fleming. He provided knowledge about various medicinal plants, such as *Artemisia annua* (used to cure malaria), Cordyceps (a fungus found in cold regions), *Diospyros melanoxylon* (Tendu), *Zanthoxylum alatum* (Tejbal), *Cordia macleodii* (Dahiman), Bastar Beer (salfi), etc. He also narrated about the first 'Chipko Movement' for protection of wildlife initiated by Amrita Devi Bishnoi in which about 363 persons were sacrificed. The next lecture was delivered by Prof. Anand Kar, Professor & Head, School of Life Science, Devi Ahilya Vishwavidyalaya, Indore on "Thyroid: a small endocrine gland, but with multiple roles." Prof. Kar explained in details about the thyroid gland and the importance of thyroid hormones like Thyroxin (T4), Triiodothyronine (T3), Thyrocalcitonin and rT3 (a reverse T3). His second lecture on this day was on "Thyroid abnormalities: its etiology & treatment." He gave knowledge about thyroid disorders, such as hypothyroidism and hyperthyroidism in which he explained cretinism, myxedema, simple goiter, hashimoto disease and thyrotoxicosis, grave's disease, exophthalmic goiter, and thyroid cancer and causes of all these disorders. He recommended that various parts of the plants, such as bark, root, and leaf of various plants like *Bacopa monnieri* (Bramhi), *Bauhinia purpurea*, *Withania somnifera* (ashwagandha) etc. can be used for curing thyroid problem. The chairperson of the day was Dr. Sonali B. Dhawas and reporters were Dr. Ranjit Singh and Dr. Manoj Kujur.

### **Day 3**

On 5<sup>th</sup> December 2019 session was started with the review & reflection of previous day's session. Prof. Anand Kar delivered the first lecture of the day on "Hypertension & high BP: preventive measures." He emphasized the causes of hypertension and suggested preventive measures, such as regular exercise, diet and sleeping time that could be used to lower the risk of high blood pressure. In the second session of the day, Prof. Kar delivered a lecture entitled "Understanding the female reproductive cycle & associated problems" and explained in detail about the common reproductive health problems associated with female reproductive cycle. He also interacted with participants regarding health problems and gave very helpful information. The third session of the day started with a lecture by Dr. M. P. Thakur. He delivered his lecture on "Emerging trends and challenges in mushroom production, processing and value edition." In the last session of the day, the participants visited "National Center for Natural Resources (NCNR)." The participants were benefitted by the demonstration of several facilities and instruments, like PCR, RT-PCR, FTIR, Gel-Doc, PTC-lab, HPTLC, NMR Spectrophotometer, LC-MS-MS System, AAS, UV Spectrophotometer etc. installed in the NCNR. The chairperson

of the day was Mr. Thorat Dinesh Damodhar and reporters were Dr. Pravin Dinkar Patil, Mrs. Vinita Pandey and Mr. Dwarika Prasad Kori.

#### **Day 4**

On 6<sup>th</sup> December 2019 session started with the first lecture delivered by Prof. R.K. Pradhan, School of Studies in Life Science, PRSU, Raipur. Prof. Pradhan gave lecture on “Intellectual Property Rights and patenting procedure.” He explained acts related to patenting procedure. He also explained Copyrights, Trademarks and other types of patenting methods. He provided information about Patent Information System, Nagpur and informed that India has four patent offices in Kolkata, Delhi, Chennai, and Mumbai and we follow India Patent act 1970. Prof. K.K. Sahu, School of Studies in Biotechnology, PRSU, delivered the second lecture on the topic “Heavy metals and their management strategies for improved crop production.” His emphasis was on the effect of heavy metals on morphological, biochemical and molecular changes in plants. He explained about ‘Reactive Oxidation Species (ROS)’ and impact of Salicylic acid, and Brassinosteroids on it. He mentioned about the role of Proline and its positive effect on plants. A very interesting role of Melatonin in plants was also explained by him. In the post lunch session, a lecture was delivered by Dr. Brahma Bihari Panda, Professor (Adjunct), Berhampur University, Berhampur, Odisha on the topic “From genetics to genomics - an overview.” He delivered his lecture into three phases, first phase on Genetics, second phase on Molecular Biology and third phase on Genomics. He told about the history and journey of genetics starting from Darwin, followed by Mendel and important breakthrough in 1900-1905. He informed the participants that the establishment of the structure of DNA in 1953 was the turning point that marked the beginning of molecular biology. He explained about the discovery of Genetic code, Genes and finally DNA. He also explained the importance of Arabidopsis on account of absence of Junk DNA. In depth information about human genome project and its achievements were also explained by him. The last session of the day was for Microteaching, in which teaching skills of 12 participants were recorded for further assessment. Chairperson of the day was Dr. Purnima Seth. Reporting on the lectures was done by Dr. Sangita Sharma and Mr. Dhande Jivan Sitaram.

#### **Day 5**

On 7<sup>th</sup> December 2019 the first session began with a lecture on “Antimicrobial resistance: Emerging trends and challenges” by Prof. Arvind Neral from Department of Microbiology, Pt. JLN College, Raipur. Prof. Neral told that the emergence of microbial antibiotic resistance is a major health problem worldwide and is a global emergency. He emphasized how antibiotics act to kill the microorganisms and the mechanisms by which microbes develop resistance against these antibiotics. He explained the importance of “Antimicrobial Stewardship Programme (AMSP).” He said that judicious and rational use of antibiotics is the need of hour. The second session was addressed by Dr. Brahma Bihari Panda. He delivered lecture on “Genetic modifications through transgenic versus genome editing technologies.” Professor Panda told that

transgenic and genome editing technologies are the thirteenth area of the era. He discussed the technology CRISPR-Cas9, which is adapted from a naturally occurring genome editing system found in bacteria and archaea. Here CRISPR stands for **C**lustered **R**egularly **I**nter-spaced **S**hort **P**alindromic **R**epeats and Cas9 for “CRISPR Associated Protein 9. The afternoon sessions were for Microteaching in which teaching skills of 26 participants were recorded for further assessment. Chairperson of the day was Dr. M. Shomendra Singh; and reporters were Smt. Sushila Gilhare and Dr. Swati Sahu who were assigned to report the various activity of the day.

### **Day 6**

On 9<sup>th</sup> December 2019, the first resource person was Prof. Madan Mohan Chaturvedi, Department of Zoology, Delhi University, Delhi. He delivered the first lecture on “Design of living system.” He showed the pictures of some of the books which are related to evolutionary biology and genetics, and advised the participants to read these books. He stated that Biology begins with the difference between living and non-living system. He said that definition of living system can be explained in two points, i.e., self-organizing and self-reproducing. He explained that the first and foremost important thing is origin of a self-organized cell membrane in respect of origin of life. Water influences the design of all components of living system. He said that water has a hydrolysis activity hence it is miracle that life has originated in water. He mentioned that it is ‘Iron-Sulfur World Hypothesis’ (a biogenesis), which is responsible for the origin of the membrane Bioenergetics. It is proton-gradients system which is responsible for generating energy in non-living rock-system and also in Mitochondrial membrane (living system). The second lecture of the day was delivered by Prof. Suparna Sen Gupta on the topic “Understanding, detecting and avoiding plagiarism.” He said that plagiarism is an intellectual theft. It is ethical offence and IPR violence. He talked about ‘MENDELEY’ ‘URKUND’, keyword, abstract, references and paraphrasing. He also talked about UGC regulation-2018, concerning with plagiarism. In the afternoon session Prof. Madan Mohan Chaturvedi delivered his second lecture on the topic “Evolution of genetic material and catalysis.” He discussed that why DNA has a double stranded helical structure. He also discussed about evolutionary relationships between RNA, DNA & Protein. In his lecture he dealt with the evolution of Self-duplicating system. He said that the self-duplicating system will depend upon two properties of the molecule, the ability of copy itself, and the ability to catalyse its copying. Both the properties are found to reside in RNA. The life processes evolved around RNA, giving rise to “RNA world hypothesis.” In the last session of the day, eleven participants made their seminar presentations on different topics those were evaluated by Prof. R.K. Pradhan, SoS in Life Science, PRSU. Chairperson of the day was Dr. Shakeel Ahmed Firdousi. Reporting of the activities of the day was done by Smt. Shobha Verma and Dr. M.P. Nandeshwar.

## **Week-2 (December 10-16, 2019)**

### **Day 7**

On 10<sup>th</sup> December 2019, in the morning session, Prof. Madan Mohan Chaturvedi, delivered his third lecture on the topic “Chromatin as regulator of gene expression.” He described basic and advance structure of DNA and chromatin. He also described about methylation, euchromatin and heterochromatin. Prof. Chaturvedi introduced the participants to many new aspects of cytology and genetics, like compaction of DNA, level of chromatin structure, chromosome remodeling etc. He elucidated that in higher order of chromatin organization, the regulatory units in eukaryotes are referred to as “Topologically Associated Domains” (TADs) and explained the process of TADs mapping. In his fourth lecture, entitled “Epigenetics – metabolic regulation of gene expression” Prof. Chaturvedi linked the energetic of metabolism with regulation of gene expression via chromatin structure. He deeply explained the chromatin dynamics, organization of regulation of temporal and spatial gene expression and epigenetic differentiation. He said that the metabolic regulation of gene expression (often viewed as Epigenetic regulation) now explains the mechanism of chronic diseases, such as cancer, diabetes, atherosclerosis, Alzheimer etc. He suggested that the concept of generation of epigenetic marks of histone tails in terms of “Writer, Reader and Eraser” shall be discussed. In the afternoon sessions, 27 participants made their seminar presentations on different topics those were evaluated by Prof. R.K. Pradhan, SoS in Life Sciences, PRSU, Raipur. After completion of the seminar Dr. Pradhan gave important tips and guidance for seminar presentation in a very friendly manner. Chairperson of the day was Dr. Sayeda Parveen Qureshi. Reporting of the day activities was done by Mr. Hemant Ganweer and Mr. Shobha Ram Yadav.

### **Day 8**

On 11<sup>th</sup> December 2019 the first lecture was delivered by Dr. O.P. Agrawal, former Vice-Chancellor, Jiwaji University, Gwalior and Retired Professor, School of Studies in Zoology, Jiwaji University, Gwalior, on the topic “Significance of vermicomposting of waste in sustainable development.” The lecture of Professor Agrawal was based on different vermicultural methods and manure formation. He also explained about microbial fermentation for increasing the crop production. Prof. Agrawal explained his lecture in easy and interesting way. The second lecture of Prof. Agrawal was on the topic “Emerging trends and future prospects in spirulina superfood biotechnology.” This lecture was based on single celled protein. He also explained the different properties of spirulina as well as different methods to cure the protein, iron and vitamin deficiencies. Both the lectures of Prof. Agrawal were very interesting and beneficial for the peoples. Dr. G.B.N. Chainy, former professor and Head, P.G. Department of Biotechnology, Utkal University, Bhubaneswar, was the second resource person of the day. His topic was “Crazy human brain.” Prof. Chainy explained the structure of brain and different activities of

human brain, such as emotional expressions, memory and controls. He raised several questions in his talk, such as how brain recognizes a word, letter, number, places, faces and objects? Where it is stored in brain? How it recollects it? How does it compare two numbers or two colours or two words? How it makes a sensible sentence so that other one can understand it? How does brain distinguishes literal and absolute meaning of a word? Whether it processes information simultaneously or sequentially? How it senses with time? Can we read a mind? Is brain of a male is different from that of a female? How it takes decision? Can brain become confused? He discussed all these questions and explained it very elegantly. His lecture was very interesting and knowledgeable and the session was very interactive. The last session of the day was given to the participants for project preparation. Chairperson of the day was Dr. Santosh Kumar Pandey and reporting was done by Dr. Vibha Choubey, Ms. Shiba and Mrs. Chandrakala Patel.

### **Day 9**

On 12<sup>th</sup> December 2019, in the morning session, Prof. G.B.N. Chainy continued his lecture on “Crazy human brain” in which he unveiled the development of understanding and the functioning of human brain. He shared the contribution of Roger Wolcott Sperry (1913-1994) based on his Split Brain experiment. After the experiment, Sperry explained the role of optic chiasm and commissure for sharing the information which were collected from the eyes or optic nerves. For his contribution to the understanding the functionality of both of the hemisphere of human brain Sperry owned the renowned Nobel Prize. Further, Prof. Chainy explained the work of Wilder Penfield (1891-1976), i.e., association of human brain and expression of emotion in different situations. VS Ramachandran explained the role of hippocampus region of brain. Stan Dehaene discovered that the inferior temporal gyrus is responsible for the number sense. After the lecture participants asked a number of questions related with the brain functionality and human behaviour. On the second session of the day Prof. S. P. Adhikary, Former Vice-chancellor, FM University, Odisha and Former Professor, Department of Biotechnology, Visva-Bharati, currently at Bhubaneswar, delivered a lecture on “Stress adaptation mechanism and survival strategies of terrestrial biofilms: with reference to cyanobacteria on stone surfaces of monuments.” In his lecture he described about the various types of cyanobacteria found on different habitats specially those which were grown upon rocks and archeologically important monuments and sculptures. He said that the biofilm formed by the bacteria protects them during the drought condition. The chemical compounds present in the biofilm can be used for the formation of UV protective cosmetic products but the limitation is non-culturability of cyanobacteria in *in vitro* condition. Further he explained that the cyanobacteria growing over the monuments and sculptures deteriorate these structures and reduces their life. Thereafter, he suggested the method of protection of sculptures using blue/green light during daytime and UV light treatment at night. In the afternoon session, Prof. Keshari Lal Verma, Honourable Vice Chancellor, Pt. Ravishankar Shukla University, Raipur addressed the participants of the Course. In this session, assessment of the Microteaching was carried out and was evaluated by Prof. V.

Rai. At the end of all sessions the Chairperson Dr. Anjali Rawani gave vote of thanks on behalf of all the participants and HRDC, PRSU. Reporting of the day was done by Dr. Tarun Kumar Patel and Mr. Deepak Kumar Dewangan.

### **Day 10**

On 13<sup>th</sup> December 2019, in the morning session, Prof. S.P. Adhikary delivered the first lecture on “Cyanophyceae/ cyanoprokaryota or cyanobacteria? Techniques: how it was established with cell fractionation?” Prof. Adhikary explained about the study of small living things (microorganisms) with the help of various microscopes. He described the similarities of several characteristics of blue green algae and bacteria that lead them to place in the same super kingdom: PROCARYOTA. In addition, he informed that studies on the ultrastructure of the cell wall and cell envelope, and their chemical composition strengthened the nomenclature of these organisms as Cyanobacteria. He gave knowledge on performing the Probes for protein, nucleic acid, irons, oxidation state and organelle specific probe. Prof. Adhikary also explained about cell fractionation process. The second lecture of the day was also delivered by Prof. S.P. Adhikary on topic “Biofertilizers for organic Farming: Cyanobacteria biofertilizer for rice cultivation – establishment of industry for self employment in rural areas.” Prof. Adhikary explained about the various bacterial and algal members and the process of nitrogen fixation. He further explained about Nod gene of *Rhizobium* and Heterocyst. He gave knowledge about the measurement of nitrogenase activity. He also explained about the preparation of blue green algae (popularly known as BGA or cyanobacteria) and *Azolla* biofertilizers for rice cultivation and its importance in rural area. In the last two sessions, all 12 groups presented their project work that they carried out during this Course. Prof. M. Mitra evaluated their project work. Chairperson of the day was Dr. Rajendra Kochale and reporters were Dr. Vidya Dashrath Kapgatee and Mr. Indrabhanu Singh Kanwar.

### **Day 11**

On 14<sup>th</sup> December 2019, in the morning session, the first session of the day was dedicated to the test based on MCQs. The participants appeared at the test very enthusiastically. The second and the post-lunch sessions of the day were very enlightening as two eminent resource persons delivered very informative and scholarly lectures on interesting topics. The first resource person Prof. Jagat Kumar Roy, Professor & Head, Department of Zoology, Banaras Hindu University, Varanasi, spoke on a very interesting topic “Your genes talk about your health.” Prof. Roy elegantly emphasized the correlation between genetic disorder and disease. Prof. Roy also threw light on point mutation and chromosomal mutations. He explained the patterns on inheritance of genetic disease and gave examples of haemophilia and sickle cell anemia. Prof. Roy also explained the method of detecting sickle cell anemia by RFLP. He highlighted that cancer is a genetic disease, which arises due to individual’s genetic susceptibility to carcinogens. Mutations in three major classes of genes contribute to tumorigenesis: these are proto-oncogenes, tumor



suppressor genes, and DNA repair genes. In the afternoon session, Prof. Roy delivered his second lecture on “Pattern formation during development.” He explained that in the course of development the single cell divides repeatedly and gets differentiated into different cell types. The genomes of differentiated cells remain the same; it is the pattern of gene expression that changes. Using various examples, such as *Dictyostelium discoideum*, *Caenorhabditis elegans*, *Drosophila melanogaster* he illustrated the genetic control of body pattern formation. He said that by identifying the *Hox* genes and other pattern forming genes by studying their pattern of expression in connection with development and differentiation we are now beginning to understand the genetic basis of pattern formation in vertebrates. In the last session, Dr. Rohit Seth, Department of Zoology, Guru Ghasidas University, Bilaspur, delivered an enlightening lecture on “Obesity studies in human and alternative models.” Prof. Seth spoke in details about the role of CNS in regulation of food intake and hormonal regulation of food and Leptin (LEP) resistance. He also talked about ob/ob gene in context of obesity. He said that recent researches have pointed out the importance of studying the gut microbiota in obese individuals. The gut microbiota is reported to be responsible for the development of LEP resistance. Dr. Seth also discussed satiety signals. He informed that animal models, such as mice, zebrafish, and fruit fly may serve as good models for research on the normal and dysfunctional regulation of appetite and used for diabetes and obesity studies. Both the resource persons spoke on very relevant topic and presented their views convincingly. Their lectures widened the participant’s knowledge horizon and were immensely benefited by their discourse. Chairperson of the day was Dr. Latika Bhatia and reporters were Dr. Madan Waskel and Ms. Anita Pandey.

## **Day 12**

On 16<sup>th</sup> December 2019, the first lecture of the day was delivered by Prof. A.K. Pati, Vice Chancellor, Gangadhar Mehar University, Sambalpur, Odisha, on the topic “Why should we know about our internal clocks?” All participants interacted with Prof. Pati very enthusiastically as the topic was new to them. Prof. Pati discussed about the chronobiological arrow of time. He told that earlier we think that clock is situated in brain only but now it has been proved that every cell has a biological clock. He explained with examples about types of biological rhythms, properties of circadian rhythms, and best marker rhythms. He highlighted that patients with cancer or any other severe diseases have the disturbed circadian rhythm. He said that circadian rhythm has wide implications for human health and welfare. He demonstrated the importance of time for the treatment (chronotherapy) of these severe diseases. Life span of the patients can be increased if drugs are given to them according to their biological clock. In fact, it was an interactive session in which participants also actively participated in the discussion. The second lecture was also delivered by Prof. Pati. The title of the lecture was “Research under constraints: good or bad.” The lecture was related to research all about. He explained with examples how good science can be practiced with no to very minimum input. He narrated his own story revealing the way he carried out research under constraints and limitations. He motivated the

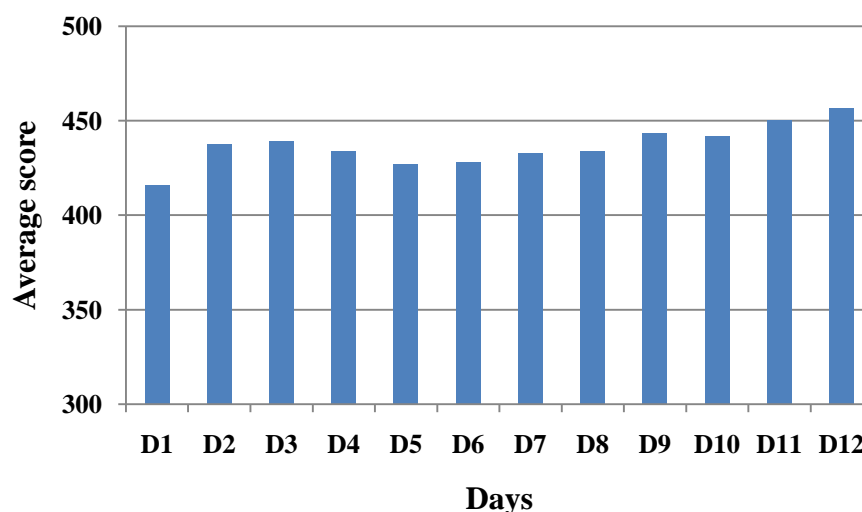
participants to do research in few resources and gave innovative ideas. He resolved queries of participants. In a nutshell, the two lectures delivered by Prof. Pati were indeed innovative in their essence and content. The third lecture of the day was delivered by Prof. S.K. Jadhav, SoS in Biotechnology, PRSU, on “Biofuels.” He described that bioenergy is energy derived from biofuels. He also explained about Jatropha plant seeds which are very rich in oil. Therefore, it is used as biofuel. Bioethanol is also produced from rice bran. Chairperson of the day was Dr. Neela Das and reporters were Dr. Roopshika Agrawal and Dr. Sanjana Bhagat.

On the last session of the day as well as of the Refresher Course, a concluding/ valedictory session was organized for the participants. In this session, Prof. A.K. Pati, Prof. A.K. Gupta and Prof. Arti Parganiha addressed the participants. The participants gave their oral feedback on the various aspects of the Refresher Course. At the end of the program, Prof. A.K. Pati and Prof. A.K. Gupta distributed the certificates to all participants for attending the Refresher Course in Life Science.

### **Feedback by participants**

The participants of the Course gave their feedback on: (1) about the program, and (2) lectures delivered by the resource persons. The higher score of the scale for ‘about the program’ was 500; and score for the ‘lectures delivered by resource persons (RP)’ was 60. RP1 to RP20 were: Dr. S.B. Velrulkar, Dr. Meenakshi Sinha, Dr. Vibhuti Rai, Prof. Mitashri Mitra, Prof. M.L. Naik, Prof. Anand Kar, Prof. M.P. Thakur, Prof. R.K. Pradhan, Prof. K.K. Sahu, Prof. Brahma Bihari Panda, Prof. Arvind Neral, Prof. Prof. M.M. Chaturvedi, Prof. Suparna Sen Gupta, Prof. OP Agrawal, Prof. G.B.N. Chainy, Prof. S.P. Adhikary, Dr. Rohit Seth, Prof. Jagat Roy, Prof. A.K. Pati, and Prof. SK Jadhav. Overwhelming responses from the participants were received, which was indicated by the high level of the scores.

The relative impact of the program has been depicted in Figure-2.



**Figure-2: Relative impact of the program [based on feedback from the participants]**

**Technical Report**  
Refresher Course in Life Science [December 3-16, 2019]

**Schedule of Activity of the Refresher Course**

Week-I								
Date	09:30-10:30	10:30-11:30	11:30-12:00	12:00-13:30	13:30-14:15	14:15-15:45	15:45-16:00	16:00-17:30
Tuesday 3.12.2019	<i>Registration</i>	Inaugural Session/ Interaction with Director and Course Coordinator	<i>Tea break</i>	Lecture 1 (SBV)	<i>Lunch</i>	Lecture 2 (MS)	<i>Tea break</i>	Lecture 3 (VR)
Date	09:45-10:15	10:15-11:45	11:45-12:00	12:00-13:30	13:30-14:15	14:15-15:45	15:45-16:00	16:00-17:30
Wednesday 4.12.2019	Review & Reflection	Lecture 4 (MM)	<i>Tea break</i>	Lecture 5 (MLN)	<i>Lunch</i>	Lecture 6 (AK)	<i>Tea break</i>	Lecture 7 (AK)
Thursday 5.12.2019	Review & Reflection	Lecture 8 (AK)		Lecture 9 (AK)		Lecture 10 (MPT)		Visit to NCNR
Friday 6.12.2019	Review & Reflection	Lecture 11 (RKP)		Lecture 12 (KKS)		Lecture 13 (BBP)		Micro-teaching
Saturday 7.12.2019	Review & Reflection	Lecture 14 (BBP)		Lecture 15 (AN)		Micro-teaching		Micro-teaching
Monday 9.12.2019	Review & Reflection	Lecture 16 (MMC)		Lecture 17 (SSG)		Lecture 18 (MMC)		Seminar
Week-II								
Tuesday 10.12.2019	Review & Reflection	Lecture 19 (MMC)	<i>Tea break</i>	Lecture 20 (MMC)	<i>Lunch</i>	Seminar	<i>Tea break</i>	Seminar
Wednesday 11.12.2019	Review & Reflection	Lecture 21 (OPA)		Lecture 22 (OPA)		Lecture 23 (GBNC)		Project preparation
Thursday 12.12.2019	Review & Reflection	Lecture 24 (GBNC)		Lecture 25 (SPA)		Micro-teaching assessment		Micro-teaching assessment
Friday 13.12.2019	Review & Reflection	Lecture 26 (SPA)		Lecture 27 (SPA)		Project Evaluation		Project Evaluation
Saturday 14.12.2019	Review & Reflection	Lecture 28 (JKR)		Lecture 29 (JKR)		Lecture 30 (RS)		MCQ Test
Monday 16.12.2019	Review & Reflection	Lecture 31 (AKP)		Lecture 32 (AKP)		Lecture 33 (SKJ)		Valedictory ceremony & Certificate Distribution

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**People as Resource Persons with Titles of Talks**

S. No.	Name of Resource Person	Affiliation	Title of talk
1.	Dr. S.B. Velrulkar, Prof. & Head	Department of Plant Molecular Biology & Biotechnology, Indira Gandhi Krishi Vishwavidyalaya, Raipur	DNA based markers and its applications
2.	Dr. Meenakshi Sinha, Additional Professor	Department of Physiology, All India Institute of Medical Sciences, Raipur	Chronopatterns of metabolic diseases : Trends & challenges
3.	Dr. Vibhuti Rai, Retd. Professor	SoS in Life Science, Pt. Ravishankar Shukla University, Raipur	Regulation of carbohydrate metabolism
4.	Prof. Mitashri Mitra, Prof. & Head	Sos in Regional Studies, Pt. Ravishankar Shukla University, Raipur	Genetic polymorphism associated with Cancer
5.	Prof. M.L. Naik, Retd. Professor	SoS in Life Science, PRSU, Raipur	Biodiversity
6.	Dr. Anand Kar, Professor and Head	School of Life Sciences, Devi Ahilya Vishwavidyalaya, Indore	<ol style="list-style-type: none"> <li>1. Thyroid: a small endocrine gland, but with multiple roles</li> <li>2. Thyroid abnormalities: its etiology &amp; treatment</li> <li>3. Hypertension &amp; High BP: Preventive measures</li> <li>4. Understanding the female reproductive cycle &amp; associated problems</li> </ol>
7.	Prof. M.P. Thakur	Indira Gandhi Krishi Vishwavidyalaya, Raipur	Emerging trends and challenges in mushroom production, processing and value addition
8.	Prof. R.K. Pradhan	SoS in Life Science, Pt. Ravishankar Shukla University, Raipur	Intellectual Property Rights and patenting procedure
9.	Prof. K.K. Sahu	SoS in Biotechnology, Pt. Ravishankar Shukla University, Raipur	Heavy metals and their management strategies for improved crop production
10.	Dr. Brahma Bihari Panda, Professor (Adjunct)	Department of Botany, Berhampur University, Berhampur, Odisha	<ol style="list-style-type: none"> <li>1. From genetics to genomics - an overview</li> <li>2. Genetic modifications through transgenic versus genome editing technologies</li> </ol>
11.	Prof. Arvind Neral	Department of Microbiology, Pt. J.N.M. Medical College, Raipur	Antimicrobial resistance - Emerging trends and challenges
12.	Prof. Madan Mohan Chaturvedi	Department of Zoology, University of Delhi (North Campus), Delhi	<ol style="list-style-type: none"> <li>1. Design of living system</li> <li>2. Evolution of genetic material and catalysis</li> <li>3. Chromatin as regulator of gene expression</li> <li>4. Epigenetics – metabolic regulation of gene expression</li> </ol>

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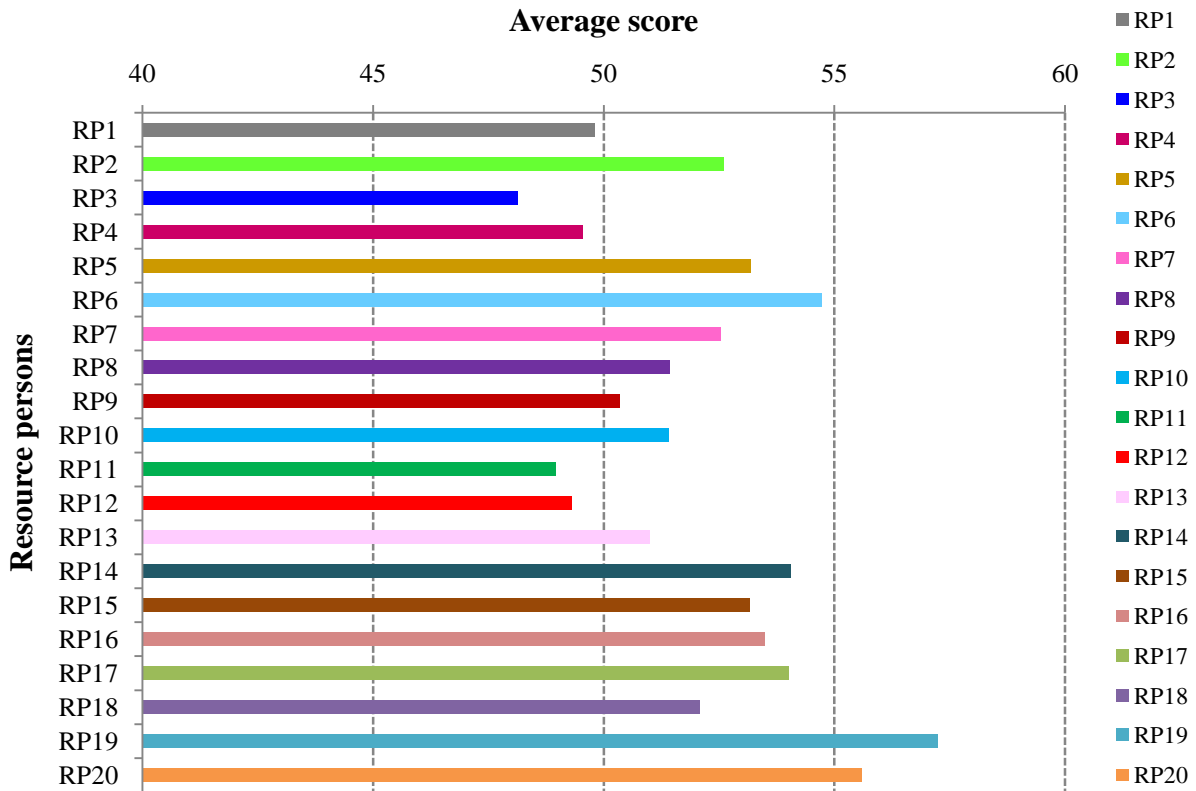
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13.	Prof. Suparna Sen Gupta	Librarian, Pt. Ravishankar Shukla University, Raipur	Understanding, detecting and avoiding plagiarism
14.	Prof. OP Agrawal, Former Vice Chancellor	Jiwaji University, Gwalior and Retired Professor, School of Studies in Zoology, Jiwaji University, Gwalior	<ol style="list-style-type: none"> <li>1. Significance of vermicycling of waste in sustainable development</li> <li>2. Emerging trends and future prospects in spirulina superfood biotechnology</li> </ol>
15.	Dr. G.B.N. Chainy, Former Professor and Head	P.G. Department of Biotechnology, Utkal University, Bhubaneswar	<ol style="list-style-type: none"> <li>1. Crazy human brain – Part I</li> <li>2. Crazy human brain – Part II</li> </ol>
16.	Dr. Siba Prasad Adhikary, Former Professor	Department of Biotechnology, Visva-Bharati (A Central University), Santiniketan Current address, Bhubaneswar	<ol style="list-style-type: none"> <li>1. Stress adaptation mechanism and survival strategies of terrestrial biofilms: with reference to cyanobacteria on stone surfaces of monuments</li> <li>2. Cyanophyceae/ cyanoprokaryota or cyanobacteria? Techniques: how it was established with cell fractionation?</li> <li>3. Biofertilizers for organic Farming: Cyanobacteria biofertilizer for rice cultivation – establishment of industry for self employment in rural areas</li> </ol>
17.	Prof. Jagat Roy, Professor & Head	Department of Zoology, Banaras Hindu University, Varanasi	<ol style="list-style-type: none"> <li>1. Your genes talk about your health</li> <li>2. Pattern formation during development</li> </ol>
18.	Dr. Rohit Seth	Department of Zoology, Guru Ghasidas Vishwavidyalaya, Bilaspur	Obesity studies in human & alternative models
19.	Prof. A.K. Pati, Vice Chancellor	Gangadhar Meher University, Amruta Vihar, Sambalpur, Odisha	<ol style="list-style-type: none"> <li>1. Why should we know about our internal clocks?</li> <li>2. Research under constraints: Good or bad?</li> </ol>
20.	Prof. SK Jadhav	SoS in Biotechnology, Pt. Ravishankar Shukla University, Raipur	Biofuels

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Responses of the participants on lectures of resource persons (average score) have been depicted in Figure-3.



**Figure-3: Responses of the participants for resource persons [average score based on feedback from the participants]**



**Participants of the Refresher Course with honourable Vice Chancellor, PRSU, Prof. Keshari Lal Verma; Director, HRDC, Prof. A.K. Gupta, and Course Coordinator, Prof. Arti Parganiha**

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All the participants rated this Course as excellent. They appreciated a lot the activities of the Course. The outstation participants also appreciated the Lodging & Boarding facility in the premises of HRDC; however, they mentioned some problems related to unavailability of food on the same premises. All the participants showed keen interest in participating in the future programs of the HRDC, PRSU, Raipur.

**Voice of the participants**

1. Number of lectures and other activities should be minimized; for two weeks program it is too much hectic.
2. Lectures on statistical tools and analysis should also be included.
3. More time should be given for the preparation of project work and seminars.
4. Field trips should be organized for the outstation participants on holidays.
5. Assessment of microteaching should be done simultaneously during recording to save the time.
6. Mess facility should be there on the premises of HRDC.

(Prof. Arti Parganiha)  
Course Coordinator