

School of Biotechnology, Faculty of Science, BHU

Evaluative Report “NAAC”

1. Name of the Department : **School of Biotechnology**
2. Year of establishment : **1986**
3. Is the Department part of a School/Faculty of the university: **Faculty of Science, Banaras Hindu University**
4. Names of Programmes / Courses offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., etc.) : **M. Sc. (Biotechnology)**
5. Interdisciplinary courses and departments involved : **Statistics and Biochemical Engineering and Chemical Engineering and Technology, IIT BHU.**
6. Courses in collaboration with other universities, industries, foreign institutions, etc. : **None**
7. Details of programmers / courses discontinued, if any, with reasons : **None**
8. Annual/ Semester/Choice Based Credit System : **Semester**
9. Participation of the department in the courses offered by other departments:
 1. **P. G. Diploma, Center for Genetic Disorders**
 2. **M. Sc. Applied Microbiology, M. Sc. Environmental Science, Department of Botany**
 3. **B. Sc. Industrial Microbiology, Department of Botany**
 4. **M. Sc. Molecular and Human Genetics**
10. Number of teaching posts sanctioned and filled (Professors/Associate Professors/Asst. Professors)

Name of the Post	Sanctioned	Filled	Vacant
Professor	2	0	2
Associate Professor	3	3	0
Assistant Professor	7	2	5

11. Faculty profile with name, qualification, designation and specialization
(D.Sc./D.Litt./ Ph.D./M.Phil., etc.)

Name	Qualification	Designation	Specialization	No. of Years of Experience	No. of Ph.D. students guided for the last 4 years
Dr. Ashok Kumar	Ph. D.	Professor	Molecular Microbiology	<28 Years	07
Dr. A.K. Tripathi	Ph. D.	Professor	Bacterial Genetics & Genomics	<25 Years	02
Dr. S.M. Singh	Ph. D.	Professor	Immunology, Cell Biology & Animal Cell Culture	<25 Years	04
Dr. A.M. Kayastha	Ph. D.	Professor	Enzymology	<25 Years	04
Dr. Arvind Kumar	Ph. D.	Associate Professor	Molecular Biology and Immunology	<10 Years	01
Prof. B. D. Singh	Ph. D.	Emeritus Professor	Plant Tissue Culture	<40 Year	06

12. List of senior Visiting Fellows, faculty, adjunct faculty, emeritus professors:

S. No.	Name	Designation	Institute/ Department
1	Dr. B. D. Singh	Emeritus-Prof.	School of Biotechnology
2	Dr. S. N. Upadhyay	Professor	Deptt. Chemical Engg. and Techn. IIT, BHU
3	Dr. S. K. Srivastava	Professor	School of Biochemical Engg. IIT, BHU
4	Dr. S. Kundu	Professor	School of Biochemical Engg. IIT, BHU
5	Dr. B. N. Rai	Associate Professor	Deptt. Chemical Engg. and Techn. IIT, BHU
6	Dr. Sanjeev Kumar	Associate Professor	Deptt. of Statistics, Faculty of Science, BHU
7	Dr. B. S. Srivastava	Retd. Scientist	CDRI, Lucknow, UP
8	Dr. D. V. Amla	Deputy Director	NBRI, Lucknow, UP
9	Dr. A.U. Khan	Associate Professor	AMU, Aligarh, UP
10	Dr. U. Chattopadhyay	Scientist	ICMR, Kolkata, WB
11	Dr. A. Chatterji	Professor	NEHU, Shillong
12	Dr. B. K. Tiwari	Associate Professor	Pondichery University
13	Dr. Rajesh Sharma	Assistant Professor	VBSPU, Jaunpur, UP
14	Dr. S.K. Tiwari,	Associate Professor	VBSPU, Jaunpur, UP
15	Dr. Kalpana Pai	Associate Professor	Pune University, Pune

16	Dr. A. C. Bharti	Asstt. Director	ICPO, Noida, UP
17	Dr. P. K. Ambasht	Associate Professor	NEHU, Shilong
18	Dr. Srinivasan	Scientist	IARI New Delhi
19	Dr. G. R. K. Rao	Professor	Sharda Univ., Greater Noida, UP
20	Dr. P. K. Srivastava	Asstt. Director	Daichi Sankyo, Gurgaon

13. Percentage of classes taken by temporary faculty–programme-wise information :

None

14. Programme-wise Student Teacher Ratio : **Presently 6:1 for M. Sc. Biotechnology**

15. Number of academic support staff (technical) and administrative staff: sanctioned and filled

Name of the Post	Sanctioned	Filled	Vacant
Technical			
Sr. Technical Asstt.	1	1	0
Technical Asstt.	1	1	0
Sr. Lab Asstt.	1	1	0
Lab Attendant	2	2	0
Mechanic	1	0	1
Non-Teaching			
Sr. Asstt.	3	3	0
Peon	1	0	0
Centre for Bioinformatics			
Information Officer	1	1	0
Programmer	1	1	0
Data Entry Operator	3	2	1

16. Research thrust areas recognized by funding agencies:

- **Cellular and Molecular Immunology**
- **Applied and Molecular Microbiology**
- **Bacterial Genetics & Genomics**
- **Tumor Biology**
- **Stress Biology**
- **Enzyme Technology**

17. Number of faculty with ongoing projects from a) national, b) international funding agencies and c) Total grants received. Give the names of the funding agencies and grants received project-wise: **Number of Faculty : 03**

Project name	Started Year	Name of funding agency	Amount (in lakhs)
Exploitation of Plant Growth Promoting Rhizobacteria for Sustainable Agriculture	2006	ICAR	55.00
Microbial sequestration of carbon dioxide using suspended growth, attached growth and immobilized enzymes and whole cell reactor	2006	DBT	27.00
Cellular and Molecular Studies on the Immunomodulatory Effect of <i>Mycobacterium w</i> on macrophage in vitro	2006	DBT	55.00
Research project sanctioned by DBT entitled ' To develop central facility for transmission and scanning electron microscopy and related infrastructural facilities.	2006	DBT	218.00
Prospecting novel genes from the metagenome of coal beds for the biotransformation of lignite coal into high efficiency fuels	2008	DBT	40.00
Isolation, Identification & Development of Methanogens for <i>In situ</i> Generation of Methane from Coal Seams	2008	ONGC	40.00
Bioprospecting of plants and microbes for <i>In situ</i> arsenic phytoremediation in the aquifers of Bihar	2008	CSIR	07.50
Studies on the Expression and Function of 'Nucleotide binding Oligomerization Domain' Proteins in macrophages on treatment with peptidoglycans.	2009	DBT	43.00
Genomic and proteomic analysis of the role of group III sigma factors in abiotic stress adaptation in the heterocystous cyanobacterium, <i>Anabaena</i> PCC7120	2010	DST	35.00
Mycosporine-like Amino Acids (MAAs) Synthesis and Protein Turnover during UV-B Stress in Cyanobacteria	2010	DST	29.50
Genomic, Proteomic and molecular analysis of the role of anti-anti sigma factors in environmental signaling and gene expression in <i>Azospirillum brarilense</i>	2010	DBT	44.00
Characterization and evaluation of Plant growth promoting activity of rhizoidal isolates nature to arid regions of Rajasthan	2010	DBT	08.50

Identificantion and analysis of Molecular diversity of bacteria associated with diabetic foot infection and role of host genetic factors in treatment (ICMR-SRF to Shailesh Kumar Shahi)	2010	ICMR	8.66
Identification & isolation of novel genes from the metagenome of coal beds for producing novel enzymes of industrial importance.. [DSKPDF project to Dr. Ankush Gupta]	2011	UGC	14.028
An investigation on the effect of proton pump inhibition: a role in modulation of host-tumor relationship and in designing of anti-tumor therapy against a T-cell lymphoma . [ICMR-RA project to Dr. NK Vishvakarma]	2011	ICMR	10.536
TOTAL AMOUNT			625.72

18. Inter-institutional collaborative projects and grants received

a) All India collaboration:

Faculty members have developed active collaboration with various Indian Universities/Institutes such as Department of Biochemistry and Plant Molecular Biology, UDSC, Delhi, JNU, New Delhi, Dept. of Botany, Patna Univ., Dept. of Microbiology, Jodhpur Univ., ICPO, Noida, National Botanic Research Institute, Lucknow, Indian Institute of Vegetable Research, Varanasi, IARI, New Delhi, NBAIM, Mau, ITRC, CDRI, NMRI, Lucknow etc. In addition, collaborative research / teaching works with various departments inside the university, namely, Botany, Molecular and Human Genetics, Statistics, Physics, Biochemical and Chemical Engineering (Institute of Technology), Department of Endocrinology and Metabolism, Department of General Surgery, Biochemistry and Molecular Biology Unit (Institute of Medical Sciences) and Computer Center are going on.

b) International:

Active academic collaboration with scientists of Germany, France and Slovakia

19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, etc.; total grants received.

Items	Amount (Lacs)
PG Biotech (HRD) (DBT)	110.96
Revenue grant (University)	48.84
XI Plan, OBC, UGC-SAP	110.69
DBT-ISLS	19.00
DST-PURSE	20.00
Bioinformatics-SUB-DIC	35.15

20. Research facility / centre with:

- State recognition:- Nil
- National recognition : **UGC-SAP, DST-FIST, DBT teaching program DBT-Bioinformatics Sub-DIC, DBT-ISLS**
- International recognition: None

21. Special research laboratories sponsored by/created by industry or corporate bodies:

Research facility for working on anaerobic bacteria created by ONGC, Ahmedabad, project fund.

22. Publications:

- * Number of papers published in peer reviewed journals (national / international) :
159 Full length papers 2007-2013 (List attached- see Annexure I)
- * Monographs: None
- * Chapters in Books: **13**
- * Edited Books: **None**
- * Books with ISBN with details of publishers:
 1. **Singh, B.D.** 2007. *Genetic Engineering and cloning*. Kalyani Publishers, New Delhi (Bangalore University). ISBN: 978-81-272-3681-6
 2. **Singh, B.D.** 2008. *Molecular Biology, Genetic Engineering and Biophysics*. Kalyani Publishers, New Delhi (Bangalore University; one coauthor). ISBN: 978-81-272-4128-5
 3. **Singh, B.D.** 2010. *Genetics and Molecular Biology*. Kalyani Publishers, New Delhi (GND University). ISBN: 978-81-272-6280-8
 4. **Singh, B.D.** 2011. *Objective Biotechnology*. Kalyani Publishers, New Delhi (2011) (Co-authors: B.K. and Kumar, S.) ISBN: 978-81-272-6937-1
 5. **Singh, B.D.** 2011. *Plant Tissue Culture and Plant Biotechnology*. Kalyani Publishers, New Delhi. (GND University; 2011, in press) (Co-author: Srivastava, J.P.) ISBN: 978-81-272-7063-6
 6. **Arvind Kumar** 2013. Text book of Immunology, TERI Publisher, New Delhi (ISBN:9788179933800)

- * Number listed in International Database (For *e.g.* Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.): **None**
- * Citation Index – range / average : **161-1891 / 1027.28**
- * SNIP : **124.948**
- * SJR : **117.174**
- * Impact Factor – range / average : **0.17 - 5.7 / 2.55**
- * H-index: range / average : **7 – 23 / 16.28 (Total-114)**

23. Details of patents and income generated: One patent filed. Income: **NIL**

24. Areas of consultancy and income generated: **NIL**

25. Faculty selected nationally/ internationally to visit other laboratories in India and abroad:

• **Invited Talks/ Chaired Sessions in International meeting**

(1) Dr. A. K. Tripathi, Professor

- ❖ **Invited talk and chaired a session:** 13th International Symposium on Nitrogen Fixation with Non-Legumes held at Neuher berg, Germany (September 2012)
- ❖ **Invited talk and chaired a session:** International Conference on New Horizons in Biotechnology (NHBT-2011) held at Trivandrum (November 2011)
- ❖ **Invited talk:** International Symposium on Proteomics beyond Ids held at NCL, Pune (November 2012)
- ❖ **Invited talk:** 12th International Symposium on Nitrogen Fixation with Non-Legumes held at Rio de Janeiro, Brazil (October 2010)
- ❖ **Invited talk and chaired:** Session at International Conference on Genomic Sciences & Indo-Italian Workshop on Industrial and Pharmaceutical Biotechnology held at Madurai (November, 2010)

(2) Dr. A. M. Kayastha, Professor

Invited Talk: Molecular Biophysics (ISB-2), Forschungszentrum Jülich, Jülich, Germany (June 2009)

• **Invited Talks/ Chaired Sessions in National meeting**

- Prof. Ashok Kumar, Refresher Course at BHU, IIVR, Varanasi, Inst. Agri. Sci., BHU., Patna Univ., Guest Lecture, TN University, Bhagalpur, Guest lecture, Star college scheme, MMV, BHU, Anand Engineering College, Agra
- Prof. A.K. Tripathi, , Refresher Course at BHU, DST-INSPIRE program
- Prof. S.M. Singh, University of Gorakhpur, HNB University, Garhwal
- Dr. A.M. Kayastha, Dayalbagh Educational Institute, Agra; Refresher Courses at BHU and IARI, New Delhi, Lecture in Technology Entrepreneurship Development Programme organized by IIT BHU.
- Dr. A. M. Kayastha, Invited talk in Indian Institute of Science, Bangalore.
- Dr. Arvind Kumar, Refresher Course at BHU, Govt. M.S. Golwalkar College, Rewa (M.P.), India.

26. Faculty serving in a) National committees b) International committees c) Editorial Boards d) any other (please specify):

- Member, DBT task forced on Environmental Biotechnology.
- Member DBT advisory committee: Vishwa Bharti Shanti Niketan, West Bengal, MS University, Baroda.
- UGC-SAP Advisory committee, Department of Plant Science, Bharathideasan University, Tiruchirappalli, Deptt. of Biotechnology, AMU, Aligarh
- Advisory Board, PG Biotechnology program, TM Bhagalpur Univ.
- Board of studies, Mizoram Central University, Aizwal, Mizoram
- Board of studies, BR Ambedkar University, Lucknow.
- Board of studies, M.K.K.V., Varanasi
- Member, Board of Governors, Biotech Research Society of India.
- Chairman, Board of Studies in Biotechnology, Rajiv Gandhi Technical University Bhopal
- Member, Scientific Advisory Board, 13th International Symposium on Nitrogen Fixation with Non-Legumes, Munich

- Member, Executive Council, Indian Academy of Microbiology.
- Department of Bioinformatics, University of Allahabad, Allahabad, UP.
- Research Degree Committee of Biotechnology, VBS Purvanchal University, Jaunpur, UP.
- Research Degree Committee of Biochemistry, Rani Durgavati Vishwavidyalay, Jabalpur, MP.
- Member of Advisory Committee (Department of Biotechnology, Government of India)
- External member: DBT Advisory Committee, Vishva-Bharti, Shantiniketan, West Bengal
- External Expert on the Board of Studies (Botany), Dayalbagh Educational Institute (Deemed University), Agra (Since 2011)
- Member Task Force on Transgenic Biofertilizers, DBT, New Delhi
- Member, DBT - Bio-safety Research committee, Central University of Bihar, Patna.

Editorial Board Members:

- BHU Journal of Science
- *Oriental Pharmacy and Experimental Medicine* (Published by Springer).
- *Lymphoma* (Published by Hindawi)
- *Blood and Lymphatic Cancer: Targets and Therapy*: (Published by Dove Press).
- Associate Editor, *Agricultural Sciences*, Springer
- Editor, *Journal of Proteins and Proteomics*, International Science Press (Since 2010)
- Editorial Board Member, *Journal of Plant Biochemistry and Biotechnology*, Springer (Since 2008); *Indian Journal of Agricultural Biochemistry*, *Protein and Peptide Letters*, *International Journal of Ayurvedic and Herbal Medicine*, *Biochemical Compound Hebert open Access*, *Interhad Journal of Biotechnology and Biochemistry*.

27. Faculty recharging strategies: Under progress

28. Student projects:

- Percentage of students who have done in-house projects including inter-departmental projects: **100% mostly in the Department.**
- Percentage of students doing projects in collaboration with other universities / industry / institute: **NIL**

29. Awards / recognitions received at the national and international level by Faculty:

(1) Dr. Ashok Kumar, Professor

UGC- BRS one time grant award (2010)

(2) Dr. A. K. Tripathi, Professor

Fellow, National Academy of Agricultural Sciences, New Delhi (2009)

Fellow, National Academy of Science (India) (2012)

(3) Dr. S. M. Singh, Professor :

Alexander Von Humboldt revisit fellowship (2007)

(4) Dr. A. M. Kayastha, Professor

Fellow, National Academy of Agricultural Sciences, New Delhi (2007)

Prof. CNR Rao Award (2011) for excellence in scientific research in Biotechnology (2012).

(5) Dr. Arvind Kumar

Rashtriya Gaurav Award, New Delhi, India (2012)

30. Seminars/ Conferences/Workshops organized and the source of funding (national / international) with details of outstanding participants, if any.

Seminar	:	01
International conference	:	01
Workshop	:	05

31. Code of ethics for research followed by the departments: Experiments on animals and human samples if any passed through respective ethical committees of the university:

32. Student profile course-wise: (2007-11)

Name of the Course	Applications received	Selected		Pass percentage	
		Male	Female	Male	Female
M. Sc. Biotechnology (Total)	129	81	32	100%	100%
Ph. D (Total)	368	28	11	100%	100%

33. Diversity of students

Name of the Course (refer to question no. 4)	% of students from the same university	% of students from other universities within the State	% of students from universities outside the State	% of students from other countries
M. Sc (Biotechnology) 2007	3	7	3	-
M. Sc (Biotechnology) 2008	1	9	3	-
M. Sc (Biotechnology) 2009	-	4	6	-
M. Sc (Biotechnology) 2010	3	3	13	-
M. Sc (Biotechnology) 2011	4	3	6	-
M. Sc (Biotechnology) 2012	2	6	3	-

34. How many students have cleared Civil Services and Defence Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.

NET-JRF (CSIR/UGC) : 54
 DBT- JRF : 03
 GATE : 60
 IAS- : 02

35. Student progression

Student progression	Percentage against enrolled
UG to PG	-
PG to M.Phil.	-
PG to Ph.D.	95%
Ph.D. to Post-Doctoral	~80%
Employed	
<ul style="list-style-type: none"> • Campus selection • Other than campus recruitment 	~20%
Entrepreneurs	

36. Diversity of staff

Percentage of faculty who are graduates	
of the same university	50%
from other universities within the State	-
from universities from other States	50%
from universities outside the country	-

37. Number of faculty who were awarded Ph.D., D.Sc. and D.Litt. during the assessment period: **None**

38. Present details of infrastructural facilities with regard to:

New Building under OBC grant under construction with following facilities:

G-0 Lecture Theatre--01, Practical Hall--01

G-1 Lecture Theatre--01, Practical Hall--01

G-2 Res. Laboratory--03, Practical Hall--01

G-3 Library--01, Bioinformatics Centre Room-01

Existing Building (in use):

- a) Library : **1**
- b) M.Sc. Lecture Hall : **1**
- c) Seminar Hall (with about 200 sitting capacity) : **1**
- d) M.Sc. Practical lab. : **2**
- e) Research lab. : **7**
- f) Central Instrument Lab. : **1**
- g) Bioinformatics centre : **1 (3 rooms)**
- h) Animal House complex : **4 rooms**
- i) Plant/Microbes culture complex : **4 rooms**

Other Infrastructural Facilities:

- a) The school has provision of uninterrupted power supply with provision of 200 KVA and 63 KVA Gensets.
- b) The school gets stabilized power supply with installation of 300 KVA transformer.
- c) Cold room with enough space and routine equipment is available.
- d) Almost all the labs and offices are having internet connectivity.
- e) Bioinformatics centre has acquired a number of software for works related to genomics and proteomics.
- f) The school has developed a well equipped CIL with provision of equipments namely, DNA sequencer, FACS, FPLC, Nano drop spectrophotometer, High speed refrigerated centrifuge, Spectrofluorimeter etc.

39. List of doctoral, post-doctoral students and Research Associates:

- a) From the host university: (Registration 2007 onward)

Sl. No.	Name	Host/ Other University	Year of award/ presently working
1	Dr. Shikha Tarang	Host	2007
2	Dr. Varun Kesharwani	Host	2007
3	Dr. Mukti Nath Mishra	Host	2008
4	Dr. Sanjeev Kumar	Other	2008
5	Dr. Alok Ranjan Singh	Host	2009
6	Dr. Anil Kumar	Host	2009
7	Dr. Sandeep Kumar	Host	2009
8	Dr. Vijendra Kumar Mishra	Other	2009
9	Dr. Alka Dwevedi	Host	2009
10	Dr. Sushil Kumar	Host	2009
11	Dr. Venkatesh Chaturvedi	Host	2010
12	Dr. Rashmi Rai	Host	2011
13	Dr. Preeti Ahuja	Other	2011
14	Mr. Hemant Singh	Other	Ongoing
15	Dr. Arpana Kumari	Host	2010

16	Dr. Umesh P Srivastav	Other	2010
17	Mr. Ashutosh Kumar Rai	Other	2013
18	Km. Namrata Gupta	Host	2013
19	Mr. Rajeev Kumar Pandey	Host	2013
20	Mr. Kunal H. Bhatt	Host	2013
21	Mr. Durgesh Narayan Singh	Other	2013
22	Km. Shalini Verma	Other	Submitted
23	Mr. Anjani Kumar	Host	2011
24	Mr. Santosh Kumar	Other	2013
25	Dr. Yogesh Dahiya	Host	2013
26	Mr. Chandradeo Narayan	Host	Submitted
27	Mr. Devesh Kishore	Other	2013
28	Mr. Nilesh Singh	Other	2013
29	Dr. Naveen K. Vishvakarma	Other	2010
30	Km. Rituparna Chakravorty	Host	2013
31	Km. Kritika Singh	Host	Ongoing
32	Km. Garima Srivastava	Host	Ongoing
33	Mr. Sudhir Singh	Other	Ongoing
34	Mr. Vijay Shanker Singh	Other	Ongoing
35	Dr. Ashok Kumar Pandey	Other	2010
36	Dr. Simrjot Kaur	Other	2010
37	Km. Tripti Dogra	Other	Ongoing
38	Dr. Suchitra	Other	2011
39	Mr. Ashish Yadav	Host	Ongoing
40	Mr. Rahul Singh	Other	Submitted
41	Dr. Sweta Jha	Other	2010
42	Km. Preeti Rai	Other	Ongoing
43	Mr. Rakesh Srivastava	Other	Ongoing
44	Mr. Rahul Singh	Other	2013
45	Mr. Shailesh K. Shahi	Host	Ongoing

46	Mr. Ajay Kumar	Other	Ongoing
47	Mr. Piyoosh K. Babele	Other	Ongoing
49	Mr. Ashutosh K. Rai	Other	Ongoing
50	Mr. Shivakant	Other	Ongoing
51	Mr. Amit Srivastav	Other	Ongoing
52	Ms. Reena Deshmukh	Other	Ongoing
53	Ms. Kanchan Vishnaoi	Other	Ongoing
54	Mr. Gaurav Verma	Other	Ongoing
55	Mr. Vivek K. Singh	Other	Ongoing
56	Mr. Chandan Singh	Host	Ongoing
57	Ms. Anupama Priyadarshini	Other	Ongoing
58	Mr. Ashutosh P.Dubey	Other	Ongoing
59	Mr. Vinay Kr. Singh	Other	Ongoing
60	Mr. Vijay Kr. Singh	Other	Ongoing
61	Mr. Himanshu Dubey	Other	Ongoing
62	Ms. Ranjana Das	Host	Ongoing
63	Ms. Chhaya Singh	Other	Ongoing
64	Ms. Parul Pandey	Other	Ongoing
65	Mr. Jay Kumar	Other	Ongoing
66	Mr. Gagandeep Singh	Other	Ongoing

40. Number of post graduate students getting financial assistance from the university:

Through DBT (27)

41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology. **NA**

42. Does the department obtain feedback from ;

a. Faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilize the feedback? Yes,

Faculty members frequently provide suggestions related to curriculum and

teaching / learning evaluation. These are discussed before the teachers council and board of studies members. Accordingly curriculum / teaching learning evaluation are developed /modified.

- b. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback? Yes,

Students feed backs are obtained in writing and constructive suggestions are implemented.

- c. Alumni and employers on the programmes offered and how does the department utilize the feedback?

Their feedbacks are frequently obtained and steps are taken to implement the same.

43. List the distinguished alumni of the department (maximum 10):

S. No.	Name Alumni	Present Place
1.	Dr. R. P. Sinha	Associate Prof. Deptt. of Botany, BHU
2.	Prof. Rakesh Kumar Singh	Professor, University of Nebraska, USA
3.	Dr. Dharmendra Rathore	Assistant Prof. NIH, USA
4.	Dr. R. P. Singh	Scientist F, CSIR New Delhi
5.	Dr. Sunil Kateriya	Assistant Prof. University of Delhi South campus
6.	Dr. Alok Chandra Bharti	Assistant Director, ICPO, Noida, UP
7.	Dr. G. Srinivas	Joint Secretary, UGC, Hyderabad
8.	Dr. Giridhar Pandey	Assistant Prof. University of Delhi South campus
9.	Dr. Dinesh Kumar	Senior Scientist NDRI Karnal, Haryana
10.	Dr. Ashish Lal	Head, Genetic Division, NCI, NIH, Bethesda, MD, USA
11.	Dr. Subba Rao	Asstt. Professor, IISc, Banglore
12.	Dr. Nisheeth Agrawal	Asstt. Professor, THSTI, Gurgaon
13.	Dr. Subhash C. Verma	Asstt. Professor, University of Nevada at Reno, USA
14.	Dr. D. P. Singh	Senior Scientist, NBAIM, Mau

44. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts.

S. No.	Guest Faculty Name	Duration	Lecture topics
1	Dr. D. V. Amla NBRI, Lucknow	2-5 April, 2010	Recent advances in Plant Biotechnology
2	Dr. A.U. Khan AMU, Aligarh	30 March to 01 April, 2010	Use of PCR in molecular Biology
3	Dr. U. Chattopadhyay ICMR, Kolkata	27-29 March, 2010	Tumor Immunotherapy Success and pitfalls
4	Dr. Anupam Chatterji NEHU, Shillong	30 September to 03 October, 2010	Molecular Genetics: Recent advances in biotechnology
5	Dr. B. K. Tiwari Poundichery University	28 March to 02 April, 2011	Tools and techniques of Bioinformatics
6	Dr. Rajesh Sharma VBSPU, Jaunpur	2-3 April, 2011	Selected topics on Biochemical engineering
7	Dr. Anupam Chatterji NEHU, Shillong	5-8 November, 2011	Applications of modern biotechnology techniques in population genetics
8	Dr. S.K. Tiwari, VBSPU, Jaunpur	2-3 April, 2011	Selected topics on Biochemical engineering
9	Dr. Kalpana Pai	April 2010/2011 2 days each	Molecular Biology of infectious agents
10	Dr. Alok Chandra Bharti ICPO, Noida	30 August, 2011	Novel aspects of oncogenesis
11	Dr. P. K. Ambasht NEHU, Shilong	20 September, 2011	Photosynthesis
12	Dr. Srinivasan IARI, New Delhi	03 March, 2012	Enzyme mechanism and regulation
13	Dr. G. R. K. Rao Sharda Univ., Greater Noida	24 March, 2012	Genetic engineering approaches in biotechnology
14	Dr. Alok Chandra Bharti ICPO, Noida	October 12, 2012	Novel aspects of oncogenesis
15	Dr. Punit Srivastava, Asst. Director	06-07 October, 2012	Drug discovery, DNS-drug interactions

45. List the teaching methods adopted by the faculty for different programmes:

Black Board teaching; Power point & multimedia presentation; Internet; hand outs and conducting seminars

46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored:

Evaluated by DBT, New Delhi, on yearly basis. Advisory meetings are also held yearly.

47. Highlight the participation of students and faculty in extension activities.

(I) STEP (ii) IIPC (iii) USIC/RSIC (iv) Patent Promotion Cell (v) Guest house with capacity (about 50 rooms University Guest House) (vi) Seminar/Conference Room with capacity of 100 persons (vii) Regional/Mainframe computing facilities (viii) Central Library with documentation facilities Centre (x) Women Development Cell.

Students and faculty members held discussions for improving library, laboratory and other teaching facilities of the School on regular basis.

48. Give details of “beyond syllabus scholarly activities” of the department.

The School organized frequently invited talks of National/ International Scientist.

49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details. Yes, DBT, Gov't of India: Performance of teaching and research programme are evaluated by DBT, New Delhi DBT has given 'A' Grade to the School. (See Annexure II)

50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied:

(a) Excellence achieved in the following areas:

1. The peroxisome proliferators-activated receptor (PPAR) γ plays an important role in macrophage inflammatory homeostasis. Findings based on real time RT-PCR and immunoblot analysis revealed that peptidoglycan (PGN) treatment of macrophages leads to biphasic effect on PPAR γ expression e.g., an early upregulation and a late suppression. It was noted that inhibition of ERK MAP

kinase by PD98059 abolished the early and rapid induction of PPAR γ , while the inhibition of JNK MAP kinase by SP600125 nullifies the late inhibitory effect on the PPAR γ expression in a dose-dependent manner (Pandey *et al.*, 2012). Results suggest that PGN induces PPAR γ expression which is regulated by MAPKs activation and this enhanced PPAR γ in turn attenuate NF- κ B activity probably via enhancing p65 nuclear export. In another study, it has been demonstrated that Nod2 knockdown mouse peritoneal macrophages secrete more IL-1 β than normal macrophages when stimulated with PGN. Study targeting TLR responses in combination with muramyl dipeptide (MDP) and PGN suggested that Nod2 and TLR2/1 signalling pathways are independent and do not interact at the level of MAPK or NF- κ B activation (Dahiya *et al.*, 2011). It has been also demonstrated that PGN induces enhanced expression of iNOS and NO production through activation of protein tyrosine kinases and PKCdelta, which in turn initiates NF-kappaB activation and translocation to nucleus (Bhatt *et al.*, 2010).

2. It has been demonstrated that *Yersinia pestis* recombinant proteins such as rLcrV inhibits the immunological functions of macrophages, whereas YopB and F1 antigen induce the activation of immunological functions of macrophages.
3. It has been demonstrated that tumor cells show variations in their survival, induction of apoptosis and susceptibility to chemotherapeutic agents depending on the stage of tumor progression and gender of the tumor-bearing host. Findings clearly suggested that antitumor strategies will have to be modulated depending on the tumor-stage-dependent survival properties of tumor cells and the gender of the tumor-bearing host.
4. Molecular mechanisms underlying tumor growth retarding effect of proton pump inhibitor pantoprazole (PPZ) have been worked out involving genes and proteins regulating survival cell cycle and apoptosis. It was demonstrated that reversal of tumor-induced immunosuppression, favoring polarization of macrophages to M1 type can be manifested by blocking proton pump.
5. The anti-neoplastic action of NSAID- aspirin was found to be associated with alteration in cell cycle regulation in tumor cells along with involvement of tumor

microenvironment in a gender-dependent manner which had impact on evolution of multi-drug resistance.

6. It has been demonstrated that the antitumor action of curcumin involves modulation of tumor microenvironment and glucose metabolism. Curcumin also showed myelopotentiation effect in tumor-bearing host, which is mediated by altered profile of bone marrow resident macrophages. *Listeria* infection showed alterations in macrophage polarity and hematopoiesis and thus may be beneficial in anti-tumor therapeutic strategy. It was also noted that inhibition of fatty acid synthesis by specific inhibitor can be utilized as a novel therapeutic strategy against tumor cell survival.
7. 198 diazotrophic bacteria from rhizosphere of rice/ wheat have been isolated and characterized in detail. 65 isolates have been identified employing 16S rDNA sequencing and accession numbers have been obtained. Isolates such as *Sphingomonas* sp. (C3S5), *Agrobacterium* sp. (VA8S1), *Ancylobacter* sp (AJ 3-2), *Advenella* sp (VA2S3), *Acinetobacter* sp (VA3S1), *Curtobacterium* sp (SB 1-5), and *Stenotrophomonas maltophilia* (SR 2-2) seem to be new additions to the existing literature on rhizospheric bacteria from eastern U.P. Employing PCR-based assay such as ARDRA and DGGE molecular diversity among different isolates has been established (Shahi *et al.*, 2011). Genes such as *nifH*, *ipdc* and *mps* have been PCR amplified from a number of isolates and their role in plant growth promotion activity has been tested.
8. In order to understand the role of ECF sigma factors in *A. brasilense* we constructed mutants in which two genes encoding ECF sigma factors and two genes encoding anti-sigma factors were knocked out. Mutants were compared for differences in their phenotype and proteome. We also constructed *rpoE-lacZ* fusions and found that *rpoE1* was autoregulated and inducible by methylene blue, but *rpoE2* was neither autoregulated nor inducible. Both ECF sigma factors were found to be important for adaptation to oxidation stress (Nagarajan *et al*, 2008; Mishra *et al*, 2011).
9. The genes encoding a β - carbonic anhydrase and γ - carbonic anhydrase in *A. brasilense* were cloned, expressed and proteins purified (Kaur *et al*, 2009; Kaur *et*

al., 2010). β -carbonic anhydrase was characterized in detail and a technique for the production of nanocarbonate using recombinant β -carbonic anhydrase was developed and filed for patent.

10. Polymicrobial nature of diabetic foot ulcers (DFUs) infection has been established and a number of multidrug resistant bacteria have been isolated (Singh *et al.*, 2009). Additionally, culture-independent approach based on PCR has been developed to screen and identify the anaerobic bacteria present in DFUs.
11. Recombinant inbred lines were produced from the cross between rust susceptible pea variety HUVP 1 and resistant variety FC 1, and they were genotype with SSR and RAPD markers and phenotyped for their rust reaction in two environments for two years using artificial inoculation. Composite interval mapping identified one major quantitative trait locus (QTL) and two minor QTLs for reaction to rust caused by *Uromyces fabae*.
12. Slow growth conditions were created by low temperature, high osmotic concentration by adding sucrose and nonsugar alcohol, and addition of a variety of growth retardants. The shoot cultures stored for up to 12-14 months could be regenerated at frequencies close to 100%, and no genetic variation in the regenerated plants could be detected using ISSR and RAPD markers.
13. Clonal multiplication protocol for *Desmodium gangeticum* was standardized using nodal explants for axillary shoot multiplication and leaf callus for shoot regeneration. The regenerated plants were established in the field with over 90% survival. The crude extract of the plant was found to have activity against Ehrlich Ascites Carcinoma in Swiss Albino mice. Additionally, salicin was isolated from leaves and its docking with Cox 2 protein was investigated which suggested its possible role as inhibitor of this enzyme.
14. Alpha amylase was purified from mung bean and soybean and their identification carried out using MALDI. Furthermore, these were characterized biochemically, biophysically and kinetically. For application purpose, these were immobilized on suitable matrices, which stabilized the enzymes for repeated use.

15. Ureases from jack bean and pigeonpea were immobilized on gold nano particles for comparative studies. The immobilized ureases showed much better stability compared to soluble enzymes and were used for urea assay.
16. Beta galactosidase has been purified from soybean and well-characterized. It was immobilized on nano particles for preparation of 'lactose-free' milk and construction of a lactose nano probe.

(b) Teaching program:

Introduction of Minor Elective papers in M.Sc course (3 credits each); a) Microbial Technology, b) Genomics and Proteomics and, c) Immunobiology (w.e.f. 2008).

Introduction of course work for Ph.D. students w.e.f. 2009. Each student has to do course work (20 credits) spread in two semesters. Courses include; faculty level common course (3 credits), discipline- specific course (2 papers of 7 credits), research theme-specific course (2 papers of 4 credits each) and Review/presentation 2 credits).

(c) Curriculum revised : 2011 and 2012

(d) Teaching lab./equip./new facilities created:

- M.Sc. laboratory furnished and upgraded with routine equipments.
- Practicals based on the use of FPLC, PCR, FACS and spectrofluorimeter introduced.
- Teaching of Bioinformatics strengthened with the appointment of well qualified information officer.

51. Future plans of the department:

R& D activity with focus on the following areas:

i. Microbial Diversity Analysis

Research in this area is getting attention knowing the fact that bacteria makeup most of the biomass on earth, but only 1% have been cultured. There are number

of habitats whose microbial diversity analysis has remained unexplored. Culture-independent approach is needed to understand the real contributions made by microbes in terms of nutrient management, metabolite production. There is a need to employ metagenomic approach in revealing the mystery of microbial function in any system.

ii. Clinical Biotechnology

Diseases such as diabetes, gastric ulcers, cancer etc. are now becoming epidemic especially in South-Asian Countries. There is urgent need of diagnosis care and control to save the affected people. We intend to pursue research in the above area if required facilities are made available/developed.

iii. Immunotherapy and Diagnostics

1. Study on molecular mechanisms of immunosuppression in a tumor-bearing host and development of therapeutic strategies to reverse tumor-induced immunosuppression to control tumor growth.
2. To screen medical plants for their immunomodulatory and anti-tumor potential and to optimize immunotherapeutic strategies using these preparations for a tumor-bearing host.
3. To develop and optimize cell therapy for treatment of cancer using *in vitro* activated and appropriately conditioned antigen presenting cells (Macrophages and Dendritic cells) and T lymphocytes.
4. To prepare screening models to diagnose nature of immuno-suppression in tumor-bearing host.
5. To modulate stress responses for cancer immunotherapy.
6. Isolation of *Helicobacter pylori* and study of its correlation with affected patients.
7. Genetic aspects of diabetes.
8. Nano Biotechnology.

iv. Gene mapping for disease resistance

Pea rust, caused by *Uromyces fabae*, is an important disease of the crop, particularly in this region of the country. Development of disease and its severity is greatly affected by the environmental factors. This has seriously hampered the genetic analysis of pea rust resistance and, as a result, breeding for resistance. In an effort to develop molecular markers linked to rust resistance we analyzed a BC1 [(FC1 X HUVP1) X HUVP1] population and identified two RAPD markers linked one major gene (Ruf.) for rust resistance. But analysis of BC1F₂ population suggested the involvement of polygenes as well in rust resistance. We have now developed a population of recombinant inbred lines for analysis of the genetics of rust resistance and for identifying microsatellite markers linked to the rust resistance genes.

52. Detail any five Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.

- One of the most sought after centre of Biotechnology in the Country.
- Biotechnology teaching program has an interdisciplinary flavor with inputs from various department and institutes of the university (BHU)
- Special emphasis of teaching is in the areas of Molecular Microbiology, Immunology and Enzyme Technology.
- Cent-percent students qualify in National tests viz., CSIR/UGC JRF, DBT-JRF, ICMR-JRF.
- Most of the students join premier institutions like ICGEB, IISc, NCCS, IIT, TIFR, CCMB, IIT, CDFD, IMTECH, CDRI etc.

Weaknesses

- Lack of Building space (Common Room, Library etc.)
- Placement of the students