Board of Studies Meeting- III rd. Date 20/02/2019. Page (3)

AGENDA FOR 3RD BOARD OF STUDIES MEETING
OF
DEPARTMENT OF BIOCHEMISTRY,

SCHOOL OF LIFE SCIENCES ON 20.02.2019.

Item No. 1: Approval of the minutes of 2nd BOS meeting

- The minutes of 2nd BOS meeting will be placed on the table. (Annexure-I)

Item No. 2: Criteria of admission into P.G. course in Biochemistry.

- The proposal will be placed on the table (Annexure- II)

Item No. 3: Addition of three new Elective courses in Ph. D Course Work of Biochemistry.

- The proposal will be placed on the table (Annexure- III)

Item No. 4: Revised Syllabus of U.G. Courses offered by Biochemistry Department as per CBCS system.

- The proposal will be placed on the table (Annexure- IV)

Item No. 5: Approval of seats in Under Graduate (UG) and Post Graduate (PG) courses.

- The proposal will be placed on the table (Annexure- V, VI)

Any other point raised by Hon'ble members.

Board of Studies Meeting - III rd Date 20/02/2019. Page (3)

Minutes of 3rd BOS Meeting of Department of Biochemistry

held on 20th February 2019

The 3rd Board of Studies Meeting of the Department of Biochemistry, School of Life Sciences, H.N.B. Garhwal University (A Central University) was held on 20.02.2019 in the office of the Department of Biochemistry at 11 a.m.

The following members attended the meeting:

1. **Prof. N.S. Bisht** — Convener
   Dean, School of Life Sciences
2. **Dr. Nisha Singh** — Member
   Head (Incharge), Department of Biochemistry
3. **Prof. M.K. Singh** — Member
   Professor, Department of Philosophy
4. **Dr. Sarla Saklani** — Member
   HoD, Pharmaceutical Chemistry
5. **Dr. Manisha Nigam** — Member
   Assistant Professor, Department of Biochemistry

In the beginning of the meeting the Chairman of the BOS welcomed all the members and briefed them about the progress of the Department of Biochemistry. The BOS members expressed their highly appreciation and satisfaction about the courses and activities of the Department.

After that the BOS discussed and resolved the following items:

Item No. 1: Approval of the minutes of 2nd BOS meeting

The minutes of 2nd BOS meeting held on 6th February, 2018 were circulated among the BOS members. Since no comment has been received, this BOS has approved the minutes of the 2nd BOS meeting.

Item No. 2: Criteria of admission into P.G. course in Biochemistry.

The BOS discussed and resolved that for admission into P.G. course in Biochemistry, the students must have B.Sc. (in any stream of Life Sciences) with 45% marks for general and for SC/ST as per University rules.

Item No. 3: ***Addition of three new Elective courses in Ph. D Course Work of Biochemistry.***

The BOS discussed the item and approved the following three new Elective courses in Ph. D Course Work of Biochemistry.

PBE-06-Current Concepts in Immunology.
PBE-07-Advanced Cancer Biology.
PBE-08-Tools and Techniques in Biochemistry.

Item No. 4: ***Revised Syllabus of U.G. Courses offered by Biochemistry Department as per CBCS system.***

The BOS discussed the item and approved the revised syllabus of U.G Courses offered by Department of Biochemistry for the Degree of B.Sc. which is designed as per CBCS system.

Item No. 5: ***Approval of seats in Under Graduate (UG) and Post Graduate (PG) courses.***

The BOS discussed the item and approved the following number of seats considering the University Prospectus for the Session 2018-19. As such, there are 120 seats in UG and 15 seats in PG.

Department	Programme	Duration	Nature	Mode of admission	Seats Available		
					B.C. Srinagar	SRT Tehri	BGR Pauri
Biochemistry	B.Sc.	6 Sem.	Regular	Merit	120	x	x
	M.Sc. (Biochemistry)	4 Sem.	Regular	Ent. Test	15	x	x

6016
23/2/19

There being no other matter, the meeting was concluded with a vote of thanks to the chair.

20/02/19 20/2/19

Prof. N.S. Bisht
Dean,
School of Life Sciences

Dr. Sarla Saklani
HoD, Pharmaceutical Chemistry

Prof. M.K. Singh
Professor, dept. of Philosophy

Nisha Singh
20/2/19
Dr. Nisha Singh
Head (Incharge) Dept. of Biochemistry

.2.19
Dr. Manisha Nigam
Assistant Professor, Dept. of Biochemistry

Approved
23.2.2019

AGENDA FOR THE 5th MEETING OF BOARD OF STUDIES
DEPARTMENT OF BIOCHEMISTRY

Agenda No.1
To Confirm the minutes of previous Board of Studies (BOS 4th) meeting.
The proposal will be placed on the table. (Annexure-1)

Agenda No.2
To upgrade the Pre-Ph.D. syllabus of Biochemistry as per UGC.
The proposal will be placed on the table. (Annex-2)

Agenda No.3
To conduct the interview for admission in Ph.D. (Biochemistry) for session 2019-20.
The proposal will be placed on the table. (Annex-3)

Agenda No. 4
To constitute the "Departmental Academic Integrity Panel" committee for plagiarism checking.
The proposal will be placed on the table. (Annex-4)

Agenda No. 5
To approve the Course and Programme outcomes for U.G. and P.G.
The proposal will be placed on the table. (Annex-5)

Any other point raised by Hon'ble members

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Minutes of the 5th Board of Studies of Department of Biochemistry

A meeting of the 5th Board of Studies of Department of Biochemistry was held on 27th Feb 2020 in the office of the Department of Biochemistry.

Following members attended the meeting:

1. **Prof. R. P. Bhatt**
   Dean, School of Life Sciences, Chairperson

2. **Prof. P. C. Lakhera**
   Dept. of Zoology & Biotechnology, Member

3. **Dr. Sarla Saklani,**
   Dept of Pharmaceutical Chemistry, Member

4. **Dr. Daya Krishna Tamta**
   Associate Professor, VCSGGMSR, Srinagar, Garhwal, Member

5. **Dr. Manisha Nigam**
   Assistant Professor, Department of Biochemistry, Member

Chairperson, BOS welcomed the members and placed the agenda for the discussion. Following decisions have been taken unanimously:

Item No. 1 Approval of the minutes of previous Board of Studies (BOS 4th) meeting

The minutes of the 4th BOS meeting held on 23-04-19 was circulated among the members. Since no comments has been received, this BOS has approved the minutes of 4th BOS meeting.

(11)

Item No. 2 To upgrade the Pre-Ph.D. syllabus of Biochemistry as per UGC.

As per university order No. Acad/2020/49 dated 11 Feb. 2020 in reference to UGC, New Delhi letter No. D.O.No. F.1-1/2018(Journal/ CARE) dated Dec. 2019, "Research and Publication Ethics" paper was included as a compulsory course for Pre-registration course work. BOS approved this course work.

Item No. 3 To conduct the interview for admission in Ph.D. (Biochemistry) for session 2019-20.

As per the result of the Ph.D. entrance examination 2019-20 declared by the university administration, 2 (two) candidates were found to be provisionally eligible for the interview.

Overall, 02 provisionally eligible candidates reported for interview at Department of Biochemistry, HNBGU. On verification of the documents as mentioned in INTERVIEW CALL LETTER, 02 candidates were found to be eligible for the interview by the BOS of the department. Thereafter, BOS conducted the interview.

On the basis of the combined performance in the entrance examination and interview, the BOS recommends and select the following candidate for admission in the Ph.D. programme in Biochemistry offered by the Dept. of Biochemistry, School of Life sciences:

Selected Candidate:

PRAVEEN KUMAR CHATURI

Wait-Listed Candidate:

PREETI

27/02/2020

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Item No. 4 To constitute the "Departmental Academic Integrity Panel" committee for plagiarism checking

As per university order No. Acad/2020/57 in reference to UGC, New Delhi letter No. D.O.No. F.1-18/2010(CPP-II) dated 06 Aug 2018, the **"Departmental Academic Integrity Panel"** committee is proposed to be constituted for plagiarism checking as follows:

Chairperson: Dean, School of Life Sciences

Member: (1) Prof. P.C Lakhera (2) Prof. J.S. Chauhan
(Senior academician from outside the department, to be nominated by the **Hon'ble Vice Chancellor**)

Member: Dr. Nisha Singh, Dept of Biochemistry

Item No. 5 To approve the Course and Programme outcomes for U.G. and P.G.

The BOS discussed the Course and Programme outcomes for U.G. and P.G. and approved the items.

There being no other matter, the meeting was concluded with a vote of thanks to the chair.

27/2/2020

27/02/2020

27/02/2020

Hemvati Nandan Bahuguna Garhwal University (A Central University)
Srinagar (Garhwal), Uttarakhand- 246 174, India

Ref: HNBGU/Biochem/2020/ Date: 27-02-20

To
The Vice Chancellor
HNB Garhwal University
Srinagar

Through Proper Channel

(Subject: Approving the proceedings of the Board of studies of the Department of Biochemistry)

Hon'ble Madam,

This is to inform you that meeting of the Board of studies of the Department of Biochemistry had been conducted on 27-02-20. The minutes of the meeting has been attached herewith for the approval. It is requested to kindly accord your approval.

Thanking you

Sincerely

(Dr. Manisha Nigam)

(Dean, SLS)

(Deputy Registrar, Academic)

1535
8/6/2029

Signature .....

Date .....
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पाठ्यक्रम समिति बायोकेमिस्ट्री विषय की दिनांक 27-2-20 ~~के लिए गये निर्णयों में~~ मद नं० 02 स्कूल बोर्ड में प्रस्तुत किया जाना है। शेष मद BOS की संस्तुति के ~~बाद~~ पश्चात यथानुसार कुलपति जी के अनुमोदनार्थ प्रस्तुत।

11/5/2020

SO Acad)

~~DR(A)~~

Agenda items no. 2, 4 & 5 needs approval of School Board.

BOS minutes are submitted for kind approval please.

11/5/20

Registrar 10.06.2020

Hon'ble VC

12.6.2020

40
11/06/2020

HNBGU Dated 25.02.2020. Further, in lieu of existing Elective Lab Courses two (02), four credits Courses have been incorporated.

The Revised Pre-Ph.D. syllabus for implementation w.e.f. 2019-2020, is placed before the BoS for approval as follows **(Annex. 18.22)**:-

Code	Course	Credits	MM
Core-I	Research Methodology	04	100
Core-II	A. Research and Publication Ethics (RPE)	02	100
	B. Project Report	01	100
Elective-I	A. Tool and Techniques	04	100
	B. Bioinformatics & Intellectual Property Rights		
Elective-II	A. Microbial Biotechnology	04	100
	B. Plant Biotechnology		

Resolution: Approved.

18.23: In reference to letter No. Academic/2020/57 dated 12.02.2020, the Convener BoS proposed the ***Departmental Academic Integrity Panel (DAIP)*** for the Department of Biotechnology for approval of BoS as follows:-

a. Chairman – Head of the Department (Prof. P. C. Lakhera)
b. Member – Senior academician from outside the department, to be nominated by Hon'ble Vice Chancellor (proposed as under)
   (i). Prof. H.C. Nainwal, Department of Geology, Birla Campus, Srinagar
   (ii). Prof. P. Prasad, HAPPRC, Birla Campus, Srinagar
c. Member – A person well versed with anti plagiarism tools, to be nominated by Head (Dr. G.K. Joshi, Department of Biotechnology, Birla Campus, Srinagar).

Resolution: The DAIP as proposed is Approved.

18.24: The Committee recommended for construction of minimum requirement of Building for proper establishment and smooth functioning of the Department of Biotechnology. A proposal in this regard has already been submitted by Prof. Pramesh Lakhera to Hon'ble Vice Chancellor dated 02.02.2018 is placed before BoS for approval **(Annex. 18.24)**.

Resolution: Proposal for new Building for Department of Biotechnology is approved with request to the University for Early Construction of Building.

18.25: List of Theory, Lab Course and Ph.D. Examiners of Biotechnology Courses is finalized by the Committee and tabled before the BoS, for approval. It is proposed that Chairperson, BoS, be authorized to modify the list of experts as per requirement and to submit to University as & when required **(Annex. 18.25)**.

Resolution: Approved.

18.26: The Department is new but Biotechnology Courses has never received an annual grant from the University. The University is requested to make provision for Lab Grant (Chemicals & Glassware Rs 10,00,000), Equipment Grant Rs 10,00,000, Books Grant Rs 5,00,000 and other Contingent Grant Rs. 3,00,000 all annually for the Department of Biotechnology.

Resolution: Approved & University is requested to make such provision for future.

		IV Progress Report (14.05.2019-13.11.2019)
06.	**Shreya Agarwal**	I Progress Report (14.11.2017-13.05.2018). II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
07.	**Shailesh Kumar**	Fifth Progress Report
08.	**Aadil Ayaz**	1st Progress Report Batch 2014*
09.	**Amit Kumar**	Sixth and Final Progress Report

**the progress report Mr. Aadil Ayaz was submitted but it was not passed in the earlier meetings of BoS hence it is placed in this meeting.*

Resolution: Six monthly progress reports of candidates from S. No. 01 to 06 & Annual Progress report from S. No. 07 to 09 are Approved.

18.18: Approval of **"*Ordinance for Integrated 5 Years Master Degree Program*"** prepared in accordance with CBCS Examination System. The ordinance is in view of implementation for **"Integrated 5 Years M. Sc. Biotechnology"** from 2020-21.

The Ordinance is prepared carefully by the committee approved by the Hon'ble Vice Chancellor and tabled before the BoS for examination, critical evaluation / modification & accordingly for approval **(Annex. 18.18)**.

Resolution: Approved. Send this Ordinance to Chairman, Ordinance Committee for critical evaluation / modification & approval by Ordinance Committee.

18.19: The modified Syllabi of **"M.Sc. Biotechnology (all 4 semesters)"** is placed before the BoS for approval & implementation from session 2020-21. The syllabus is modified by the committee approved by Hon'ble Vice Chancellor **(Annex. 18.19)**.

Resolution: Approved.

18.20: The modified Syllabi of **"Integrated 5 Years M.Sc. Biotechnology (all 10 semesters)"** is placed before the BoS for approval and implementation from session 2020-21. The syllabus is modified by the committee approved by the Hon'ble Vice Chancellor **(Annex. 18.20)**.

Resolution: Approved.

18.21: The modified Syllabi of **"Biotechnology Course/ subject in B.Sc. Class (all 6 Semester)"** is placed before the BoS for approval & implementation from session 2020-21. The syllabus is modified by the committee approved by the Hon'ble Vice Chancellor **(Annex. 18.21)**.

Resolution: Approved.

18.22: Changes were made in the **Pre-Ph.D. syllabus** w.r.t. letter No. Academic/2020/49, Dated 11.02.2020 to include **two (02) Credit Course entitled "*Research and Publication Ethics (RPE)*"** as Compulsory Core Course in Pre-PhD syllabus.

The Credits have been allotted to Courses (Core/Elective) are as per the directions received by email from Prof. A.R. Nautiyal, Convener, Ordinance Committee,

PROCEEDINGS

BOARD OF STUDIES, DEPARTMENT OF BIOTECHNOLOGY
HEMVATI NANDAN BAHUGUNA GARHWAL UNIVERSITY, SRINAGAR

Meeting: 18th Meeting **Dated: 23 May 2020**

Venue: Through video Conferencing **Time: 11:00 am**

In accordance with the relevant provisions of the Ordinances, the Registrar issued a notification with Ref. No. Acad./2020/165 dated 20.05.2020 to conduct meeting of Board of Studies, Department of Biotechnology through video conferencing. **(Annex. 18.01)**

Following members participated in the meeting:

01. Prof. Pramesh C. Lakhera	**Chairperson**
02. Dr. Sudhir Kumar	**Member**
03. Dr. M. S. Chauhan	**External Expert**
04. Prof. M. C. Nautiyal	**Vice Chancellor Nominee**
05. Prof. Y. S. Farswan	**Vice Chancellor Nominee**

Item Nos:

18.01: The Chair welcomed all Hon'ble members for sparing their valuable time and participating in this first meeting of BoS, Department of Biotechnology. The Chairperson gave sincere thanks to Hon'ble Vice Chancellor for granting permission to hold meeting through video conferencing. He also expressed deep gratitude to Hon'ble Vice Chancellor, Members of Executive Council & Committee of three Deans of Schools for giving independent status to Department of Biotechnology. As per the circulated agenda, items discussed and the following recommendations are made: -

18.02: Minutes of the 17th meeting of BoS, Biotechnology dated **9 September, 2019** are placed for confirmation **(Annex. 18.02).**

Action Taken Report: The proceeding was submitted to Joint Registrar (Academic) by the Chairperson through Dean, SLS for its approval in Academic Council.

Resolution: Approved

18.03: Consequent upon the letter No. HNBGU/RO/2020/04 dated 06.03/2020 and No. HNBGU/Adm(T)/2020/550 dated 07.03.2020, the Department of Biotechnology was separated from the Department of Zoology & Biotechnology. It is proposed to approve that the Department of Biotechnology kindly be listed as independent Department in all documents of University whenever & wherever it is required to be listed (e.g. list of Departments in School of Life Sciences, Prospectus, University website etc.).

Resolution: Approved & requested to University as proposed.

18.04: The following Committee of Faculty members of Department of Biotechnology was proposed and kindly approved by Hon'ble Vice Chancellor for completion of

PROCEEDINGS

BOARD OF STUDIES, DEPARTMENT OF BIOTECHNOLOGY
HEMVATI NANDAN BAHUGUNA GARHWAL UNIVERSITY, SRINAGAR

Meeting: 21st Meeting

Dated: 01 April, 2022

Venue: Online and Offline (Blended) (Department of Biotechnology, Chauras Campus)
Time: 11:30am

In accordance with the relevant provisions of the Ordinances, the Registrar issued a notification with Ref. No. Acad./2022/850 dated 16.03.2022 to conduct meeting of Board of Studies Department of Biotechnology.

Following members participated in the meeting: -

01. Dr. Pooja Saklani	**Chairperson**
02. Dr.G.K. Joshi	**Member**
03. Dr. Mamta Arya	**Member**
04. Prof. Arvind Bhatt	**External Expert**
05. Prof. J.S. Chauhan	**Nominee, Hon'ble Vice Chancellor**
06. Prof. Y. S. Farswan	**Nominee, Hon'ble Vice Chancellor**

The Chair heartily welcomed all Hon'ble participating members and briefly apprised them the purpose of the meeting. As circulated earlier, the agenda items were discussed and the following recommendations are made: -

Item Nos: -

21.01: The proceeding of 20th meeting of BoS dated 08.11.2021 placed for confirmation.

Action Taken Report: - The proceeding was submitted to Joint Registrar (Academic) by the Chairperson through Dean SoLS for its approval in Academic Council

Resolution: - Approved

21.02: Approval of Progress Report submitted by Ph.D. Scholars

The Six-monthly progress reports duly forwarded by respective supervisors, have been submitted by the following Ph.D. Scholars for approval.

	Name of the Student	Progress Report Duration
01	Babita Rana	8thProgress Report (14-05-2021 to 13-11-2021)
02	Lokesh Kumar	8thProgress Report (14-05-2021 to 13-11-2021)
03	Rahul Thakur	8thProgress Report (14-05-2021 to 13-11-2021)
04	Saranya Joshi	8thProgress Report (14-05-2021 to 13-11-2021)
05	Shreya Agarwal	8thProgress Report (14-05-2021 to 13-11-2021)
06	Sachin Singh	8thProgress Report (20-06-2021 to 19-12-2021)
07	Anjali Patil	5thProgress Report (09-08-2021 to 08-02-2022)
08	Kanchan Rauthan	5thProgress Report (09-08-2021 to 08-02-2022)
09	Atul Krishna Dev	5thProgress Report (09-08-2021 to 08-02-2022)

PROF. A.K. [illegible]
Dean, School [illegible]

Resolution: - Approved.

21.03 Regarding signing Memorandum of Understanding (MOU) with Regional Centre for Biotechnology, Faridabad for Academic and Scientific Collaboration in Areas of Mutual Interest

A proposal regarding signing of Memorandum of Understanding (MOU) with Regional Centre for Biotechnology, Faridabad for Academic and Scientific Collaboration in Areas of Mutual Interest was placed by the Head, Department of Biotechnology. She informed thatRegional Centre for Biotechnology, Faridabad sent a proposal of MoU department agreed in principal for signing the MOU and the proposal has also been scrutinized by the Convener, RCC, HNBGU.

Resolution: The MOU proposal was discussed and approved by BOS

21.04 The modified **Pre-Ph.D. syllabus** is placed before BoS for Approval and implementation from 21-22 **as follows**

Pre - Ph.D. Biotechnology

Course Code	Course / Paper	Credits	MM
S0LS/PBT/C001	Research Methodology	04	100
S0LS/PBT/C002	Research and Publication Ethics (RPE) & General Biotechnology	03	100
S0LS/PBT/E 001	A). Tools & Techniques	04	100
	B). Bioinformatics and Intellectual Property Rights		
S0LS/PBT/E 002	A). Microbial Techniques	04	100
	B). Plant Biotechnology		
	Total	**15**	**400**

Core Course **4 + 3 = 7 Credits**

Elective Course **4 + 4 = 8 Credits**

Total 15 Credits

Resolution: Approved

21.05 To conduct the interview for admission in Ph.D. (Biotechnology) for session 2021-22

PROF. A.K. DOBRIYAL
Dean, School of Life Sciences
H.N.B. GARHWAL UNIVERSITY
SRINAGAR - 246174

Semester VII (July to November)			
IBTC 37	XXXVII	Biochemistry	100
IBTC 38	XXXVIII	Cell Biology & Membrane Biophysics	100
IBTC 39	XXXIX	Molecular Biology & Genetics	100
IBTC 40	XL	Bio-Analytical Techniques	100
IBTC 41	XLI	Lab Course based on paper XXXVII & XXXVIII	100
IBTC 42	XLII	Lab Course based on paper XXXIX & XL	100
Total			**600**
Semester VIII (December to April)			
IBTC 43	XLIII	Immunology	100
IBTC 44	XLIV	Microbiology & Microbial Genetics	100
IBTC 45	XLV	Genetic Engineering & Applications	100
IBTC 46	XLVI	Biostatistics & Bioinformatics	100
IBTC 47	XLVII	Lab Course based on paper XLIII & XLIV	100
IBTC 48	XLVIII	Lab Course based on paper XLV & XLVI	100
IBTSS 01		Epigenetics & Cancer Biology	100
IBTSS 02		Biomedical Technology	100
Total			**600**
Semester IX (July to November)			
IBTC 49	XLIX	Plant Biotechnology	100
IBTC 50	L	Intellectual Property Rights, Bioethics, Bio-Entrepreneurship	100
IBTE 01a	LI (a)	Protein engineering	100
IBTE 01b	LI (b)	Immunotechnology	100
IBTE 01c	LI(c)	Nanobiotechnology	100
IBTE 02a	LII(a)	Food & Beverages Biotechnology	100
IBTE 02b	LII(b)	Animal Biotechnology	100
IBTE 02c	LII(c)	Enzymology & Enzyme Technology	100
IBTC 51	LIII	Lab Course based on paper XLIX & L	100
IBTE 03	LIV	Lab Course based on paper LI & LII	100
IBTSS 03		Research Methodology: Tools & Techniques	100
IBTSS 04		Science Communication & Scientific Writing	100
Total			**600**
Semester X (December to April)			
IBTC 52	LV	Environmental Biotechnology	100
IBTC 53	LVI	Fermentation & Bioprocess Technology	100
IBTE 04a	LVII(a)	Advanced Bioinformatics	100
IBTE 04b	LVII(b)	Herbal Biotechnology	100
IBTE 04c	LVII(c)	Genomics & Proteomics	100
IBTC 54	LVIII	Lab Course based on course LV & LVI	100
IBTE 05	LIX	Dissertation	100
IBTSS 05		Vaccines & Drug Development	100
IBTSS 06		Molecular Virology	100
Total			**500**

Max. Marks (MM) for each paper: 100 (two Sessional Tests of 20 each+ 60 End Term Test)

Sessional Tests (Mid Term Test, Assignment, Tutorials, Classroom Seminar & Laboratory Work; Journal Club, Internship; Industrial/ Institutional Visits, winter/summer training based report writing & presentation**)**

M. Sc. Biotechnology (Integrated 5 Years) Program will have the following components, viz.

Core Course**(C)**
Electives Course **(E)**
Self-study Course **(SS)**

DEPARTMENT OF BOTANY AND MICROBIOLOGY
H.N.B. GARHWAL UNIVERSITY (A CENTRAL UNIVERSITY)
SRINAGAR GARHWAL-246174

Meeting of Board of Studies in Botany and Microbiology was held on October 22, 2018 in the Department of Botany and Microbiology at Chauras Campus, Srinagar.

The following honorable members participated in the meeting:
Prof. D.P. Vashistha, Deptt. of Botany and Microbiology, Srinagar- Convener
Prof. R.P. Bhatt, Deptt. of Botany, Srinagar Campus- Member
Prof. C. M. Sharma, Deptt. of Botany, Srinagar Campus- Member
Prof. J.K. Tiwari, Deptt. of Botany, Srinagar Campus- Member
Dr. L.R. Dangwal, Deptt. of Botany, Tehri Campus- Member
Dr. Vineet K. Maurya, Deptt. of Botany and Microbiology, Srinagar- Member
Prof. M.C. Nautiyal, HAPRCC, Srinagar- Member
Prof. O.P. Gusain, Deptt. of Zoology and Biotech., Srinagar Campus- Member

The members discussed various academic issues as per agenda and following resolutions have been passed unanimously:

Item No. 1: Confirmation of the minutes of earlier BOS meeting.
Resolution: The honorable members of the BOS confirmed the minutes of the earlier meeting held on July 25th, 2018.

Item No. 2: Approval of published book chapters by the faculty members of the department.

2.1. Dr. B. S. Bhandari (01)

2.1.1. Poonam Gusain, Vir Singh, D. P. Uniyal and **B. S. Bhandari** (2018). Assessment of PGPR Bioinoculation in heavy metal contaminated agriculture soil and their impact on morphological, physiological and yield behavior of crop plants. In: A. Gautam and C. Pathak (Eds) Contamination in soil environment. Astral. pp 21-29.

2.2. Dr. Rahul K. Singh (02)

2.2.1. Sharma R., Srivastava R., **Singh R. K.** and Tiwari S. P. (2018). From Leuwenhoek to Craig Venter. In: Tiwari S. P. Sharma R. and Gautam N C (Eds) Recent Advances in Microbiology Vol. III. Nova Scientific Publishers. Inc. New York. USA.

2.2.2. Tyagi S., Singh P., and **Singh R. K.** (2018). Cyanobacteria: A new terminus for anti-infectious agents. In: Tripathi K. N., Kumar N. and Abraham G. (Eds) Role of Photosynthetic Microbes in Agriculture and Industry. Nova Scientific Publishers. Inc. New York. USA.

2.3. Dr. Vineet K Maurya (01)

2.3.1. Chauhan J, and **Maurya VK**. (2018). Microaglae as an effective tool for wastewater treatment and management. Chapter 03. *In*: The Role of Photosynthetic Microbes in Agriculture and Industry (Eds): Keshwanand Tripati, Narendra Kumar, Gerard Abraham. Nova Scientific Publishers. Inc. New York. USA.

Item No. 3: Inclusion of new elective paper for M. Sc. (Botany) course.

Dr. D. Kumar, a member of teaching faculty has proposed to include two new elective paper entitled (i) Algal Biotechnology and (ii) Stress biology and Molecular Genetics of Cyanobacteria, for M. Sc. (Botany) students. The papers are designed considering that applied aspects of algae need to be taught to PG students.

The syllabi of the proposed papers are annexed.

Resolution: The members agreed for inclusion of the said courses as elective papers for M. Sc. Botany as follows:

(i) Algal Biotechnology: in first group of elective papers, with paper code SLS/BOT/E001F

(ii) Stress biology and Molecular Genetics of Cyanobacteria: in second group of elective papers, with paper code SLS/BOT/E002F

Item No. 4: Request for extension/ re-registration by the Ph. D. Students.

4.1. Mr. Harish Kumar (LB-14188), in his application dated 19/09/2018, has applied for extension of six months with permission for re-registration.

The synopsis of the candidate has been approved in the BOS meeting held on 05/03/2013. Based on the synopsis approval date, the candidate has completed the period of 5 years on 04/03/2018, and should have applied for extension and re-registration prior to that.

Resolution: The members discussed the issue and decided to forward the matter to the University with request to allow him re-registration for continuation and completion of his research work.

4.2. Mr. Shailesh Prasad Vashisth (LB 14184) has requested for six month extension with effect from 26/10/2018 to 25/04/2019.

The date of enrollment of candidate is 25/04/2013, as such he has completed the period of five years on 24/04/2018.

Resolution: The members discussed the issue and decided to forward the matter to the University with request to allow him re-registration for continuation and completion of his research work.

4.3. Ms. Neha Kukreti (LB 15179), has requested to grant of one year extension for submission of her thesis.

Resolution: The extension to Ms. Neha Kukreti may kindly be granted.

MVATI NANDAN BAHUGUNA GARHWAL UNIVERSITY
SRINAGAR GARHWAL 246174 UTTARAKHAND

l Microbiology
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20.96.....

Date: 14th June, 2019

iversity

ed earlier, a meeting of Board of Studies (BOS) in Botany
the Department of Botany and Microbiology at Chauras
discuss various academic issues. The minutes are being
nd approval.

Forwarded

14-06-2019

Dean

(School of Life Sciences)

al University, Srinagar (Garhwal) for

14-06-2019

Dean

(School of Life Sciences)

DEAN
School of Life Sciences
H.N.B. Garhwal University
(Cen... ...arakhand - 246174

Department of Botany and Microbiology
HNB Garhwal University (A Central University)
Srinagar-Garhwal 246 174

A Meeting of the members of Board of Studies (BOS) in Botany and Microbiology was held on May 30th, 2019 in the Department of Botany and Microbiology at Chauras campus, Srinagar- Garhwal.
The following members were present in the meeting:

1	Prof. R.P. Bhatt	Department of Botany and Microbiology, Chauras Campus	Convener
2	Prof. C.M. Sharma	Department of Botany and Microbiology, Chauras Campus	Member
3	Prof. A.R. Nautiyal	High Altitude Plant Physiology Research Centre, Srinagar-Garhwal	Member (V.C. nominee)
4	Prof. M.C. Nautiyal	High Altitude Plant Physiology Research Centre, Srinagar-Garhwal	Member
5	Dr. Renu Negi	Principal, Govt. PG College, Satpuli	Member
6	Dr. L.R. Dangwal	Department of Botany, Tehri Campus	Member
7	Dr. Rahul K. Singh	Department of Botany and Microbiology, Chauras Campus	Member

The members discussed various issues as per agenda items and following resolutions were passed unanimously:

Item No. 1: Confirmation of the minutes of earlier BOS meeting

Resolution: *The members of the BOS confirmed the minutes of the meeting held on 25th Feb, 2019.*

Item No. 2: To conduct the interview of the candidates qualified the entrance test/exempted category for consideration of their admission in Pre-Ph.D. (Botany) and Pre- Ph.D. (Microbiology) program

Resolution:

2.1. *Total 33 candidates were called for the interview. Out of which five candidates were from exempted category and 13 from university entrance test appeared before the BOS. The candidates were interviewed for admission in Pre-Ph.D. (Botany). List of the students selected for admission in Pre-Ph.D. Course on the basis of merit is provided in annexure 1.*

2.2. *Total eight candidates were called for the interview. Out of which two candidates were from exempted category and three from university entrance test appeared before the BOS. The candidates were interviewed for admission in Pre-Ph.D. (Microbiology). List of the students selected for admission in Pre-Ph.D. Course on the basis of merit is provided in annexure 2*

Item No. 3: To consider the request of following Ph.D. students for change of Supervisor

3.1: *Ms. Asifa Mushtaq (Microbiology) has requested to allot Prof. J.K. Tiwari as her new supervisor and Dr. Seema Rawat (present supervisor) as Co-supervisor, as Dr. Rawat is on lien from the University for the last two years.*

3.2: *Ms. Pramila Verma (Microbiology) has requested to allot Prof. J.K. Tiwari as her new supervisor and Dr. Seema Rawat (present supervisor) as Co-supervisor, as Dr. Rawat is on lien from the University for the last two years.*

3.3: *Ms. Usha Devi (Botany- affiliated college quota) has requested to allot Dr. A.S. Rawat as her supervisor, as her current supervisor and the University are affiliated by the University, and to stay at Dehradun as her supervisor.*

Department of Botany and Microbiology
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4	Prof. M.C. Nautiyal	High Altitude Plant Physiology Research Centre, Srinagar-Garhwal	Member
5	Dr. Renu Negi	Principal, Govt. PG College, Satpuli	Member
6	Dr. L.R. Dangwal	Department of Botany, Tehri Campus	Member
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3.3: Ms. Usha Devi (Botany- affiliated college quota) has requested to change her supervisor, as her current supervisor and the institution have been de-affiliated by the University, and to allot Dr. A.B. Bajpai from DBS PG College, Dehradun as her new supervisor.

12	Jaffer Hussain	I[st] Progress Report	November, 2017- April, 2018
		II[nd] Progress Report	May, 2017- October, 2018
13	Rashmi Kala	I[st] Progress Report	Nov 2017- April 2018
		II[nd] Progress Report	May 2018- October, 2018

*The progress report submitted by Ms. Shivani Jasrotiya was not on the prescribed format therefore she was asked to resubmit her progress report for the aforesaid period.

Item No. 10: To consider the inclusion of UGC MOOCs in the PG syllabi as a self study/elective course.

Resolution: The email from Hon'ble Vice Chancellor dated March 06, 2019 regarding inclusion of UGC MOOCs in the PG syllabi as a self study/elective course was discussed. BOS unanimously agreed to include two UGC MOOCs in the syllabus of both M.Sc. (Botany) and M.Sc. (Microbiology) programs as two different self study/elective courses. For the upcoming semester (July-Dec 2019), BOS decided to offer two UGC MOOCs namely '*Academic Writing*' (hosted by HNBGU) and '*Analytical techniques*' (hosted by AIIMS, New Delhi) for M.Sc. (Botany) III semester students, and '*Academic Writing*' (hosted by HNBGU) and '*Biostatistics and Mathematical Biology*' (hosted by CUP, Bhatinda) for M.Sc. (Microbiology) III semester students. Further, the members of BOS recommend the transfer of 03 credits for successful completion of each course in the same semester as per UGC (Credit framework for online learning courses through SWAYAM) regulations, 2016.

Item No. 11: To consider the Course outcomes and Program specific outcomes for UG and PG courses in Botany and Microbiology

Resolution: The Course outcomes and Program specific outcomes for Botany and Microbiology courses at UG and PG levels were discussed, approved and forwarded to IQAC.

Item No. 12: To consider the suggestions of last year (2017-18) PG students on course curriculum

Resolution: Points raised by the students have been discussed and BOS has decided to constitute a departmental committee to look into the matter and also to take necessary steps for revision of syllabus.

Item No. 13: Implementation of reservation for EWS in UG and PG courses

Resolution: As per the meeting of University Officers held on dated 31[st] Jan, 2019, the reservation for EWS has to be implemented in all the UG and PG courses in two phases. Therefore, the BOS recommended the following number of seats in UG and PG courses which are being run by the department:

Category-wise distribution of seats in UG and PG classes after implementing EWS reservation

Course	Category	Present intake 2018-19	Targeted Intake after EWS implementation up to 2020-21	Phase-wise implementation of EWS 2019-20	2020-21
B.Sc. Botany	SC	183	**229** (+46)*	**206** (+23)*	**229** (+23)*
	ST	91	**114** (+23)	**103** (+12)	**114** (+11)
	OBC	329	**411** (+82)	**370** (+41)	**411** (+41)
	EWS	N/A	**152** (+152)	**76** (+76)	**152** (+76)
	Gen	617	**619** (+2)	**618** (+1)	**619** (+1)
	Total	1220	**1525 (+305)**	**1373** (+153)	**1525** (+152)
B.Sc. Microbiology	SC	16	**21** (+5)	**18** (+2)	**21** (+3)
	ST	08	**10** (+2)	**09** (+1)	**10** (+1)
	OBC	30	**37** (+7)	**34** (+4)	**37** (+3)
	EWS	N/A	**14** (+14)	**07** (+7)	**14** (+7)
	Gen	56	**56** (+0)	**56** (+0)	**56** (+0)
	Total	110	**138 (+28)**	**124** (+14)	**138** (+14)

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय
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Department of Botany & Microbiology
श्रीनगर, पौड़ी गढ़वाल२४६१७४, भारत
Srinagar, Pauri Garhwal 246 174, India

Proceedings of the meeting of the Board of Studies in Botany and Microbiology

A meeting of the members of Board of Studies in Botany & Microbiology was held today on 24.04.2022 in the Department of Botany & Microbiology, Chauras Campus through offline/online mode. The following members attended the meeting:

1.	Prof. C. M. Sharma	Head, Department of Botany & Microbiology, HNBGU, Srinagar Garhwal, Uttarakhand	Convener	
2.	Prof. R. C. Dubey	Dean Research, Gurukula Kangri University Haridwar	External expert member /Microbiology	
3.	Prof. Dinabandhu Sahoo	Director, Centre for Himalayan Studies, University of Delhi, Delhi	External expert member /Botany	
4.	Prof. Prakash Nautiyal	Head, Department of Zoology, HNBGU, Srinagar, Garhwal Uttarakhand	Member	
5.	Prof. R. K. Maikhuri	Head, Department of Environmental Sciences, HNBGUSrinagar, Garhwal, Uttarakhand	Member	
6.	Prof. J. K. Tiwari	Department of Botany & Microbiology, HNBGU, Srinagar Garhwal, Uttarakhand	Member	
7.	Dr. Manjul Dhiman	Head, Department of Botany, KLDAV PG College Roorkee, Uttarakhand	Member	

Item No. 1: Confirmation of the minutes of previous meeting of the Board of Studies held on 25.02.2022.

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय)
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Srinagar, Pauri Garhwal 246 174, India

Resolution: The hard copy of book was shown to the members of BOS and it was observed that the book was actually published.

Item No. 5: Approval of syllabi of B.Sc. Botany and B.Sc. Microbiology as per NEP 2020 framework

Resolution: The syllabi of B.Sc. Botany and B.Sc. Microbiology as per framework of NEP 2020 were approved by the BOS.

The meeting ended with a vote of thanks to the Chair.

(Prof. C. M. Sharma) (Prof. R. C. Dubey) (Prof. D. Sahoo)

(Prof. P. Nautiyal) (Prof. R. K. Maikhuri) (Prof. J. K. Tiwari)

(Dr. M. Dhiman)

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय
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			2. Sixth Progress Report (July 2020 to June 2021) 3. Seventh Progress Report (July 2021 to December 2021)	

Resolution: The Progress reports of above-mentioned candidates were approved as per the details provided against their names.

Item No. 6. Approval of Framework of NEP 2020

Description: The outlines of the NEP 2020 along with broad structure of the papers in B.Sc. and M.Sc. classes of Botany and Microbiology have been prepared as directed by the Dean, School of Life Sciences. The same are being placed before the members of the BoS for approval.

Resolution: The BoS approved the outlines of the papers as proposed.

Item No. 7. Approval of proposal for the curtailment of seats in UG and PG courses.

Description: As per the University order the Central University Combined Entrance Test is to be conducted for admission in UG and PG courses from the forthcoming academic session. Thus, the University has directed for the curtailment of seats in UG and PG courses. In this regard, following number of seats are being proposed in different courses before the members of the BoS for consideration:

Campus	Course	Proposed Seats
Srinagar	M.Sc. Botany	25
	B.Sc. Botany	200
	M.Sc. Microbiology	25
	B.Sc. Microbiology	60
Pauri Campus	M. Sc. Botany	15
	B. Sc. Botany	150
Tehri Campus	M.Sc. Botany	15
	B. Sc. Botany	150

Resolution: The BoS has approved the number of seats in UG and PG courses of Botany and Microbiology as proposed. However, any provision for seats decided by the University can be accommodated at a later stage provided it is approved by the BoS.

Item No. 8. Eligibility for admission in M. Sc. Botany and M. Sc. Microbiology courses

BoS dated 25.02.2022

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय
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Srinagar, Pauri Garhwal 246 174, India

Resolution: The BoS has approved the number of seats in UG and PG courses of Botany and Microbiology as proposed. However, any provision for seats decided by the University can be accommodated at a later stage provided it is approved by the BoS.

Item No. 8. Eligibility for admission in M. Sc. Botany and M. Sc. Microbiology courses

Description: Till date, the eligibility for admission in M. Sc. Botany and M. Sc. Microbiology is not well defined in the prospectus of the University. So every year, the department receives applications for admission in M. Sc. Botany and M. Sc. Microbiology from such students who have passed their U.G. examination in different disciplines like B.Sc. (Agriculture), B. Voc, B.Sc. MLT, etc. Thus, the eligibility criteria for admission in the above-mentioned courses should be well defined.

Resolution: The members discussed the matter and considering the nature of the courses-M.Sc. Botany and M.Sc. Microbiology, resolved that candidates having B.Sc. (Ag), B. Voc. and B.Sc. MLT degrees/diplomas are not eligible for admission in M.Sc. Botany and M.Sc. Microbiology courses. The BoS framed out eligibility criteria for admission in these courses as:

M.Sc. Botany: B.Sc. with Botany as one of the subjects.
M.Sc. Microbiology: B.Sc. with Microbiology as one of the subjects.

Item No. 9: Inclusion of a paper for the PhD students in the Pre-PhD course of Microbiology.

Description: Dr. RK Singh, Assistant Professor Department of Botany & Microbiology has requested to incorporate a paper entitled "Advances in Cyanobacteriology" in the Pre-PhD course work of Microbiology. Therefore, placed before the Board of Studies for consideration.

Resolution: The BOS has suggested to incorporate a unit related to microalgae and their biotechnological applications in the contents of the proposed paper as the paper having only cyanobacteria will not do justice with the students. Therefore, the title of the proposed paper should also be revised as "Advances in Microalgae".

Item No. 10: Approval of Academic achievements of Faculty members for their promotion from Academic Level 11 to 12 under the CAS.

Description: The following faculty members have applied for their promotion under CAS from Academic Level 11 to 12:

1. Dr. Rahul K. Singh
2. Dr. Vinod K. Maurya

BOS DATE: 25.02.2022

Proposed Elective paper:
PME-109. Advances in Microalgae

Unit I Cyanobacterial Diversity and Distribution:
Origins of life and photosynthesis; General characters of cyanobacteria (cell structure, physiology, reproduction and genome organization); Ecological and Structural Diversity; Cyanobacteria in Extreme environments; Cyanobacterial diversity-alpha, beta and gamma; Diversity indices; Problems and limitations in cyanobacterial diversity studies; Culturable and unculturable cyanobacterial diversity; Exploration of unculturable cyanobacterial diversity

Unit II Cyanobacterial Taxonomy and Systematics:
Concepts of taxonomy (characterization, classification and nomenclature); Isolation and culturing of cyanobacteria; Conventional characterization cyanobacteria (Morphometry, Biochemistry and Ecology); Molecular characterization (16S rRNA gene, secondary structure of ITS region, G+C content, DNA-DNA hybridization); DNA bar-coding; Concept of Systematics; Polyphasic taxonomy; Methods for describing novel cyanobacteria; Culture collections and their significance

Unit III Cyanobacterial Biotechnology:
Outdoor and indoor mass cultivation of cyanobacteria; Cyanobacteria as a source of biomolecules (polysaccharides, pigments, antioxidants, polyunsaturated fatty acids); UVprotecting compounds; Cyanobacteria for Biofuel; Cyanobacteria for Bioremediation; Nutraceutical and pharmaceutical uses, Bioactive compounds (antimicrobial, anti-cancer); Green synthesis of nanoparticles; Cyanobacteria as biofertilizer for paddy cultivation. Hydrogen production by cyanobacteria

Unit IV Cyanobacterial Bloom and Cyanotoxins:
Types of aquatic habitat; Bloom forming cyanobacteria; Factors responsible for cyanobacterial bloom; Types of Cyanotoxins; Cyanobacterial taxa responsible for cyanotoxins production; Hazardous effects of cyanotoxins; Molecular regulation of cyanotoxins; Monitoring and management of cyanobacterial bloom

Suggested Readings:

1. Whitton, B. A. (Ed.). (2012). Ecology of cyanobacteria II: their diversity in space and time. Springer Science & Business Media
2. Flores, E. (Ed.). (2014). Cell Biology of Cyanobacteria. Caister Academic Press.
3. Zinicovscaia, I., &Cepoi, L. (Eds.). (2016). Cyanobacteria for bioremediation of wastewaters. Switzerland: Springer.
4. Hallenbeck, P. C. (2012). Hydrogen production by cyanobacteria. In Microbial technologies in advanced biofuels production (pp. 15-28). Springer, Boston, MA.
5. Sharma, N. K., Rai, A. K., &Stal, L. J. (2013). Cyanobacteria: an economic perspective. John Wiley & Sons.
6. Sarma, T. A. (2012). Handbook of cyanobacteria. CRC Press.
7. Newcombe, G. (2012). International guidance manual for the management of toxic cyanobacteria. IWA Publishing.
8. Chauvat, F., &Cassier-Chauvat, C. (2012). Genomics of cyanobacteria (Vol. 65). Academic Press.
9. Borowitzka, M. A., &Moheimani, N. R. (Eds.). (2013). Algae for biofuels and energy (Vol. 5). Dordrecht, The Netherlands: Springer.
10. Borowitzka, M. A. (2015). Algal biotechnology. In The Algae World (pp. 319-338). Springer, Dordrecht.
11. Mishra, A. K., Tiwari, D. N. &Rai, A. N. (Eds) 2019. Cyanobacteria: From Basic Science to Applications. Academic Press.

To
Head of the Departments

Dear colleagues,kindly provide the following information totally based on the minutes of your BoS meetings. Example is also provided for your assistance in another file.

Please furnish the following information in the given formats. For information related to two points i.e. 1.1.2 and 1.2.1 please provide the BoS proceedings in PDF format (Please send the first page of the BoS proceedings along with the page in which concerned information is mentioned)
Please provide the information by 22 April, 2023.
Thank you for you cooperation

Name of Department:

1.1.2

Metric No.	Information required	Date of change as per BoS minutes				
1.1.2	1. Name of programme in which syllabus of any paper was changes or new paper was introduced between July 2017 to June 2022.	July 2017-June 2018	July 2018-June 2019	July 2019 - June 2020	July 2020-June 2021	July 2021-June 2022
Category of programme	U.G.					
	P.G.		1- 22 October 2018 2- 22 October 2018 3- 30 May 2019 4- 30 May 2019 5-30 May 2019 6- 30 May 2019			24 April 2022
	M.Phil	N.A.	N.A.	N.A.	N.A.	N.A.
	Ph.D			27 Feb 2020		25 Feb 2022
	Certificate or Diploma course	N.A.	N.A.	N.A.	N.A.	N.A.
Please mention the exact date for each academic session (as per Bos minutes) in which program was modified						

1.2.1

Metric No.	Information required	Date of introduction of new course (paper) and its name(s) as per BoS minutes				
1.2.1	1. Name of new courses(papers) in which were introduced between July 2017 to June 2022.	**July 2017-June 2018**	**July 2018-June 2019**	**July 2019-June 2020**	**July 2020-June 2021**	**July 2021-June 2022**
Category of programme	**U.G.**					Complete syllabus changed, as per NEP.
	P.G.		**1**-Algal biotechnology (M. Sc. Botany, Elective) **2**-Stress biology and molecular genetics of cyanobacterial (M. Sc. Botany, Elective) **3**-Academic writing (M. Sc. Botany, MOOC) **4**-Analytical techniques (M. Sc. Botany, MOOC) **5**-Academic writing (M. Sc. Microbiology, MOOC) **6**-Biostatistics and mathematical biology (M. Sc. Microbiology, MOOC)			
	M.Phil					
	Ph.D				Research and Publication ethics	Advances in Microalgae
	Certificate or Diploma course					
Please mention the exact date for each academic session (as per Bos minutes) in which program was modified						

1.3.2

Metric No.	Information required	Name of value-added course(s)** offered
1.2.1	1. Number of value-added courses for imparting transferable and life skills offered between July 2017 to June 2022.	**Between July 2017 to June 2022**
Category of programme	**U.G.**	**Botany:** DSE-1 Economic Botany and Biotechnology SEC-1 . Biofertilizers SEC-2 . Herbal Technology SEC-3 . Nursery and Gardening SEC-4 . Floriculture SEC-8 . Mushroom Culture Technology **Microbiology** SEC-2: Microbial Diagnosis in Health Clinics SEC-6: Microbiological Analysis of Air and Water
	P.G.	**Botany** 1. Natural Resource Management in Himalaya 2. Palynology and Pollination Biology **3.** Plant Health Management **4.** Diversity and Cultivation of Mushrooms **5.** Intellectual Property Rights **6.** Research Methodology **Microbiology** **1-**Industrial Microbiology **2-** Food and Dairy Microbiology
	M.Phil	NA
	Ph.D	**NA**
	Certificate or Diploma course	**NA**

****Value added courses**: ***Example- courses related to personality development, soft and communication skills development, language courses, environmental awareness courses, courses related to ethics, courses related to community participation and social engagement.***

1.3.3

Metric No.	Information required	Appx. No. of students enrolled in the value-added courses offered under each program				
1.3.3	1. No. of students enrolled between July 2017 to June	**July 2017-June**	**July 2018-June**	**July 2019-June**	**July 2020-June**	**July 2021-June 2022**

	2022.	2018	2019	2020	2021	
Category of programme	U.G.	Data available at Dean office.				
	P.G.	70	70	77	77	77
	M.Phil	NA	NA	NA	NA	NA
	Ph.D	NA	NA	NA	NA	NA
	Certificate or Diploma course	NA	NA	NA	NA	NA

1.3.4

Metric No.	Information required	Appx. No. of students undertaking field project or research projects or internships under each program				
1.3.4	1. No. of students enrolled between July 2017 to June 2022.	July 2017-June 2018	July 2018-June 2019	July 2019-June 2020	July 2020-June 2021	July 2021-June 2022
Category of programme	U.G.	N.A.	N.A.	N.A.	N.A.	N.A.
	P.G.	31	28	27	52	44
	M.Phil	N.A.	N.A.	N.A.	N.A.	N.A.
	Ph.D	All	All	All	All	All
	Certificate or Diploma course	N.A.	N.A.	N.A.	N.A.	N.A.

Signature 20/04/2023

Syllabus B. Sc. Microbiology NEP -2020

Semester 1

1. Core paper I: INTRODUCTION TO MICROBIOLOGY (THEORY and PRACTICAL) (6 CREDITS)
2. Additional ID-1: (AID-1 FUNDAMENTALS OF MICROBIOLOGY) (THEORY and PRACTICAL) (4 CREDITS)
3. Skill paper I: Microbiological Analysis of Air and Water (2 credits)

Semester 2

1. Core paper II: MICROBIOLOGICAL TECHNIQUES (THEORY and PRACTICAL) (6 CREDITS)
2. Additional ID-2: (AID-2: TECHNIQUES INMICROBIOLY)
3. Skill paper II: Microbial diagnosis in Health clinics (2 credits) (THEORY and PRACTICAL) (4 CREDITS)

Semester 3

1. Core paper III: MICROBIAL PHYSIOLOGY AND METABOLISM (THEORY and PRACTICAL) (6 CREDITS)
2. Additional ID-3: (AID-3: PHYSIOLOGY OF MICROBES) (THEORY and PRACTICAL) (4 CREDITS)

Semester 4

1. Core paper IV: MICROBIAL GENETICS (THEORY and PRACTICAL) (6 CREDITS)
2. Additional ID-4: (AID-4: GENETICS OF MICROBES) (THEORY and PRACTICAL) (4 CREDITS)

Note: 1. ADD ID (1,2,3,4) will be opted by those students who don't have Microbiology as core paper (Reduce the syllabus to 70 %)
2. Skill paper will be opted by Microbiology students only in 2 semesters (either 1-2 or 3-4)
3. IKS will be in any one semester and AMDC in other.

Microbiology course:

First year; Semester-I

Core paper I:

Title of the paper: **INTRODUCTION TO MICROBIOLOGY (THEORY)**

TOTALHOURS: 60 **CREDITS: 04**

Unit I: History of Microbiology No. of Hours: 08

Discovery of microorganisms; Spontaneous generation vs. biogenesis; Historical accounts of modern Microbiology; from Leeuwenhoek to Craig Venter including the contributions of Antonvon Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Martinus W. Beijerinck, Sergei N. Winogradsky, Alexander Fleming, Selman A. Waksman, Paul Ehrlich, Elie Metchni koff, Edward Jenner, Falkow, Ross and Chakravarty .and; Golden era of microbiology; Scope of microbiology.

Unit II: Classification No. of Hours: 04

Kingdom classification of microorganisms: Haeckel's three kingdom concept, Whittaker's five kingdom concept, Six kingdom classification, Eight kingdom classification, Three domain concept of Carl Woese. Definition of microorganisms, Numerical and chemical taxonomy, Introduction to Bergey's manual

Unit III: Cellular Microorganisms No. of Hours: 20

Bacteria:Morphologyofbacteria,Structureandfunctionsofcellwall,cellmembrane,flagella,pili,ribosome,nucleoid,cytoplasmicinclusionsandendospore;Fungi:Generalcharacteristics,Ultrastructureandreproduction;Protozoa:Generalcharacteristicswithspecialreferenceto *Amoeba* and *Paramaecium*; Algae: General characteristics. History of phycology with emphasis on contributions of Indian scientists;

UnitIV: Acellular Microorganisms No. of Hours: 10

Characteristic features of viruses, prions and bacteriophage; Ultrastructure: Capsids, Types of envelope, Types and structureofgenome;Cultivationofvirusesandbacteriophage;Multiplicationofviruses;Lyticand lysogenycycleof λphage.

UnitV:Microbes in Extreme EnvironmentNo. of Hours: 08

Nature, special features of the thermophilic, methanogenic and halophilic Archaea; photosynthetic bacteria, Cyanobacteria some Archaea who live in extreme conditions like cold, and space.

Unit VI: Useful and harmful aspects of Microorganisms No. of Hours: 10

Beneficial microbes: Microbes as bio fertilizers, microbial bioremediation, role of microbes in nature, Antibiotics producing microbes and other industrially useful microbes [name of the industrially useful product and producing microbes]. **Pathogenic Microorganisms:** List of common bacterial, fungal and viral diseases of human beings [Name of the disease, causative pathogen, parts affected]

First year; Semester-I

Core paper I:

Title of the paper: **INTRODUCTION TO MICROBIOLOGY (PRACTICAL)**

TOTALHOURS: 60CREDITS: 02

1. Safetyrules of workingin microbiologylab.
2. Study of principle and applications of important instruments (autoclave, laminar air flow,hotairoven,microscope,incubator,inoculator,colonycounterandvortex)use dinmicrobiologylaboratory.
3. Demonstration of spontaneous generation vs theory of biogenesis
4. Stainingoffungal cells.
5. Staining of Algal cells
6. Simplestaining and negative staining of bacterialcell.
7. Diagramatic representation of lytic and lysogenic cycle of virus replication
8. Studyofcharacteristicfeaturesof *Aspergillus*, *Penicillium*, *Amoeba* and *Paramaecium*, *Chlamydomonas*, *Euglena*, *Nostoc* and *Chlorella*.

SuggestedReadings

1. Wiley,J.M.,Sherwood,L.M.andWoolverton,C.J.Prescott,HarleyandKlein'smicr obiology.McGraw-Hill, New York.
2. Black,J.G.Microbiology:Principlesandexploration.JohnWileyand Sons,NewJersey.
3. Pelczar,M.J.,Chan,E.C.S.andKreig,N.R.Microbiology.McGraw-Hill,NewYork.
4. Dimmoc,N.J.,Easton,A.J.andLeppard,K.N.Introductiontomodernvirology.Wile y-Blackwell,New Jersey.
5. Primrose,S.B.Introductiontomodernvirology.JohnWileyandSons,NewJersey.
6. Cappucino, J. and Sherman, N. Microbiology: A laboratory manual. Benjamin/CummingsPublishingCompany, San Francisco.
7. Prescott,L.M.andHarley,J.P.Laboratory exercisesinmicrobiology.WilliamC.Brown,Dubuque.
8. Aneja,K.R.Experimentsinmicrobiology,plantpathologyandbiotechnology.NewAgeInternatio nal(P)Limited, New Delhi.
9. Kannan,K.Laboratory manualin general microbiology.Panima,New Delhi.
10. Atlas,R.M.,Brown,A.E.andParks,L.C.Laboratorymanualofexperimentalmicrobi ology.MosbyCollegePublishingCompany, St.Louis.

First year; Semester-I

Additional ID-1 (AID-1):

Title of the paper: **FUNDAMENTALS OF MICROBIOLOGY (THEORY)**

TOTALHOURS: 45CREDITS: 03

UnitI:History ofMicrobiologyNo. of Hours: 12

Discoveryofmicroorganisms;Spontaneousgenerationvs.biogenesis; Historical accounts of modern Microbiology; from Leeuwenhoek to Craig Venter including the contributions of AntonvonLeeuwenhoek,LouisPasteur,RobertKoch,JosephLister,MartinusW.Beijerinck, Sergei N. Winogradsky, Alexander Fleming, Selman A. Waksman, Paul Ehrlich,ElieMetchnikoff,EdwardJenner,Falkow, Ross and Chakravarty.and;Golden eraofmicrobiology;Scopeofmicrobiology.

UnitII:CellularMicroorganismsNo. of Hours: 13

Bacteria:Morphologyofbacteria,Structureandfunctionsofcellwall,cellmembrane,flagella,pili,ribosome,nucleoid,Fungi:Generalcharacteristics,Ultrastructureandreproduction in Algae, Fungi andProtozoa (*Amoeba* and *Paramaecium*).

UnitIII:AcellularMicroorganismsNo. of Hours: 10

Characteristic features and structure of viruses, Multiplicationofviruses;Lyticand lysogenycycleof λphage.

Unit IV: Useful and harmful aspects of Microorganisms No. of Hours: 10

Beneficial microbes: Microbes as bio fertilizers, microbial bioremediation, role of microbes in nature, Antibiotics producing microbes and other industrially useful microbes [name of the industrially useful product and producing microbes]. **Pathogenic Microorganisms:** List of common bacterial, fungal and viral diseases of human beings [Name of the disease, causative pathogen, parts affected]

First year; Semester-I

Additional ID-1 (AID-1):

Title of the paper: **FUNDAMENTALS OF MICROBIOLOGY (PRACTICAL)**

TOTALHOURS: 30

CREDITS: 01

1. Safetyrules of workingin microbiologylab.
2. Study of principle and applications of important instruments (autoclave, laminar air flow,hotairoven,microscope,incubator,inoculator,colonycounterandvortex)use dinmicrobiologylaboratory.
3. Stainingoffungal cells.
4. Staining of Algal cells
5. Diagramatic representation of lytic and lysogenic cycle of virus replication
6. Studyofcharacteristicfeaturesof *Aspergillus*, *Penicillium*, *Amoeba* and *Paramaecium*, *Chlamydomonas*, *Euglena*, *Nostoc* and *Chlorella*.

SuggestedReadings

1. Wiley,J.M.,Sherwood,L.M.andWoolverton,C.J.Prescott,HarleyandKlein'smicr obiology.McGraw-Hill, New York.
2. Black,J.G.Microbiology:Principlesandexploration.JohnWileyand Sons,NewJersey.
3. Pelczar,M.J.,Chan,E.C.S.andKreig,N.R.Microbiology.McGraw-Hill,NewYork.
4. Dimmoc,N.J.,Easton,A.J.andLeppard,K.N.Introductiontomodernvirology.Wile y-Blackwell,New Jersey.
5. Primrose,S.B.Introductiontomodernvirology.JohnWileyandSons,NewJersey.
6. Cappucino, J. and Sherman, N. Microbiology: A laboratory manual. Benjamin/CummingsPublishingCompany, San Francisco.
7. Prescott,L.M.andHarley,J.P.Laboratory exercisesinmicrobiology.WilliamC.Brown,Dubuque.
8. Aneja,K.R.Experimentsinmicrobiology,plantpathologyandbiotechnology.NewAgeInternatio nal(P)Limited, New Delhi.
9. Kannan,K.Laboratorymanualingeneralmicrobiology.Panima,New Delhi.
10. Atlas,R.M.,Brown,A.E.andParks,L.C.Laboratorymanualofexperimentalmicrobi ology.MosbyCollegePublishingCompany, St.Louis.

First year; Semester-II
Core paper II:
Title of the paper: **MICROBIOLOGICAL TECHNIQUES (THEORY)**
TOTALHOURS: 60CREDITS: 04

UnitI:Concept of SterilizationNo. of Hours: 08
Definition of sterilization, dry and moist heat, pasteurization, tyndalization; radiation, ultrasonication, filtration. Physical and Chemical methods of sterilization; disinfection sanitization, antisepsis sterilants and fumigation. Determination of phenol coefficient of disinfectant.

UnitII:Media and Pure Culture Techniques No. of Hours: 12
Culture media: basic composition, Solid and liquid media, Synthetic and complex media, Enriched and enrichment media, Selective and differential media; isolation and culture of microbes**,**inoculation and incubation and maintenance of cultures and related instruments. Pure culture techniques (Pour plate, Spreading, Streaking and serial dilution); Maintenanceandpreservation ofpureculture; Cultivationof anaerobicbacteria.

UnitIII:Microscopy, Spectroscopy and CentrifugationNo. of Hours: 14
Concept of magnification, resolution and contrast in microscopy, Introduction to Microscope, Principle, types and application of Bright Field Microscope, Dark Field microscope, Phase Contrast microscope, Fluorescence microscope, Confocal microscope, Scanning and Transmission Electron Microscope, Foldscope; Structure of simple and compound microscope, Beer-Lambart law and its application, single and double beam spectrophotometer (structure and application in microbiology), colorimeter and UV-visible spectrophotometer.

UnitIV:Stains and staining techniquesNo. of Hours: 08
Theories of staining, Mechanism of gram staining; Stain vs dye, Principle and applications of staining techniques: simple stain, differential stain, negative stain, flagella stain, endospore stain, nuclear stain, acid fast stain

UnitV:Antibacterial susceptibility testingNo. of Hours: 10
Concept of susceptibility and resistance, concept of MIC, MBC and IC-50, different methods of antibacterial susceptibility testing based on solid and liquid media.

UnitVI:Pasteurization and fermentationNo. of Hours: 08
Techniques, types and industrial application of Pasteurization and Fermentation.

First year; Semester-II
Core paper II:

Title of the paper: **MICROBIOLOGICAL TECHNIQUES (PRACTICAL)**
TOTALHOURS: 60CREDITS: 02

1. Demonstration of autoclaving process
2. Comparison of different disinfectant
3. Preparationofsolid andliquidmedia.
4. Enumerationoftotalviablecountinwater/soilsample.
5. Isolationofpureculture ofbacteria.
6. Differentiationbetweenlactosefermentor andnonfermentoronMacConkeyagar.
7. Studyofcolonymorphologyof*E.coli*on EMBagar.
8. Gramstainingofbacterialcell.
9. Demonstration of working of UV-Visible spectrophotometer
10. Demonstration of microbial culture plates showing Disc diffusion or well diffusion methods of antibacterial susceptibility
11. MIC calculation using given experimental data (experiment not to be performed, data can be hypothetical)

SuggestedReadings

1. Wiley,J.M.,Sherwood,L.M.andWoolverton,C.J.Prescott,HarleyandKlein'smicrobiology.McGraw-Hill, New York.
2. Keith Wilson And John Walker (Editors) Principles and Techniques of Biochemistry and Molecular BiologySeventh edition. Cambridge University Press.
3. Chandra H, Srivastava J, Agarwal RK. Fundamental Techniques inMicrobiology Publisher John Publisher Pvt. Ltd, New Delhi; 2016.
4. Black,J.G.Microbiology:Principlesandexploration.JohnWileyand Sons,NewJersey.
5. Pelczar,M.J.,Chan,E.C.S.andKreig,N.R.Microbiology.McGraw-Hill,NewYork.
6. Dimmoc,N.J.,Easton,A.J.andLeppard,K.N.Introductiontomodernvirology.Wiley-Blackwell,New Jersey.
7. Cappucino, J. and Sherman, N. Microbiology: A laboratory manual. Benjamin/CummingsPublishingCompany, San Francisco.
8. Prescott,L.M.andHarley,J.P.Laboratory exercisesinmicrobiology.WilliamC.Brown,Dubuque.
9. Atlas,R.M.,Brown,A.E.andParks,L.C.Laboratorymanualofexperimentalmicrobiology.MosbyCollegePublishingCompany, St.Louis.

First year; Semester-II
Additional ID-2 (AID-2):

Title of the paper: **TECHNIQUES IN MICROBIOLOGY (THEORY)**
TOTALHOURS: 45

CRE

DITS: 03

UnitI:Concept of Sterilization **No. of Hours: 10**

Definition of sterilization, dry and moist heat, pasteurization, tyndalization; radiation, ultrasonication, filtration. Physical and Chemical methods of sterilization; disinfection sanitization, antisepsis sterilants and fumigation. Determination of phenol coefficient of disinfectant.

UnitII: Media and Pure Culture Techniques **No. of Hours: 15**

Culture media: basic composition, Solid and liquid media, Synthetic and complex media,inoculation, incubation, cultures and related instruments. Pure culture techniques (Pour plate, Spreading, Streaking and serial dilution); Maintenanceandpreservation ofpureculture; Cultivationof anaerobicbacteria.

UnitIII:Microscopy **No. of Hours: 10**

Concept of magnification, resolution and contrast in microscopy, Introduction to Microscope, Principle, types and application of Bright Field Microscope, Dark Field microscope.

UnitIV:Stains and staining techniques **No. of Hours: 10**

Theories of staining, Mechanism of gram staining; Stain vs dye.

First year; Semester-II

Additional ID-2 (AID-2):

Title of the paper: **TECHNIQUES IN MICROBIOLOGY (PRACTICAL)**

TOTALHOURS: 30 **CREDITS: 01**

1. Demonstration of autoclaving process
2. Comparison of different disinfectant
3. Preparationofsolid andliquidmedia.
4. Enumerationoftotalviablecountinwater/soilsample.
5. Isolationofpureculture ofbacteria.
6. Gramstainingofbacterialcell.
7. Demonstration of microbial culture plates showing Disc diffusion or well diffusion methods of antibacterial susceptibility
8. MIC calculation using given experimental data (experiment not to be performed, data can be hypothetical)

SuggestedReadings

1. Wiley,J.M.,Sherwood,L.M.andWoolverton,C.J.Prescott,HarleyandKlein'smicr obiology.McGraw-Hill, New York.
2. Keith Wilson And John Walker (Editors) Principles and Techniques of Biochemistry and Molecular Biology Seventh edition. Cambridge University Press.
3. Chandra H, Srivastava J, Agarwal RK. Fundamental Techniques inMicrobiology Publisher John Publisher Pvt. Ltd, New Delhi; 2016.
4. Black,J.G.Microbiology:Principlesandexploration.JohnWileyand Sons,NewJersey.
5. Pelczar,M.J.,Chan,E.C.S.andKreig,N.R.Microbiology.McGraw-Hill,NewYork.
6. Dimmoc,N.J.,Easton,A.J.andLeppard,K.N.Introductiontomodernvirology.Wile y-Blackwell,New Jersey.
7. Cappucino, J. and Sherman, N. Microbiology: A laboratory manual. Benjamin/CummingsPublishingCompany, San Francisco.
8. Prescott,L.M.andHarley,J.P.Laboratory exercisesinmicrobiology.WilliamC.Brown,Dubuque.
9. Atlas,R.M.,Brown,A.E.andParks,L.C.Laboratorymanualofexperimentalmicrobi ology.MosbyCollegePublishingCompany, St.Louis.

Second year; Semester-III

Core paper III:

Title of the paper: **MICROBIAL PHYSIOLOGY AND METABOLISM (THEORY)**

TOTALHOURS: 60 **CREDITS: 04**

UnitI:MicrobialGrowthandEffectofEnvironmentonMicrobialGrowth

No. of Hours: 12 Definitionsofgrowth;Batchculture;Continuousculture;Generationtimeandspecific growth rate; Temperature and pH ranges of growth; Effect of solute and water activity ongrowth;Effectofoxygenconcentrationongrowth;Nutritionalcategoriesofmicroorganisms.

UnitII:NutrientUptakeandTransport **No. of Hours: 10**Passive and facilitated diffusion; Primary and secondary active transport; Concept of uniport,symportandantiport; Group translocation;Ironuptake.

UnitIII:Phototropy and Autotropy **No. of Hours: 18**Phototrophic metabolism: Introduction, Groups of phototrophic microorganisms, Photosynthetic and accessory pigments, Anoxygenic vs. oxygenic photosynthesis with reference to photosynthesis in green bacteria and cyanobacteria. Carbon fixation pathways

UnitIV:Carbon catabolism **No. of Hours: 10**Concept of aerobic and anaerobic respiration; Sugar degradation pathways: EMP, ED, Pentose phosphate pathway, TCA cycle, Electron transport chain: Components of respiratory chain, Comparison of mitochondrial and bacterial ETC, Electron transport phosphorylation, Uncouplers and inhibitors. Fermentation: Alcohol and Lactate fermentation,

UnitV:NitrogenMetabolism **No. of Hours: 10**An overview of Nitrogen cycle, Biological nitrogen fixation, Nitrification, Nitrate reduction, Denitrification, and Anammox.

Core paper III:

Title of the paper: **MICROBIAL PHYSIOLOGY AND METABOLISM (PRACTICAL)**

TOTAL HOURS: 60 **CREDITS: 02**

1. Study and plot the growth curve of E. coli by turbidiometric and standard plate count methods.
2. Calculations of generation time and specific growth rate of bacteria from the graph plotted with the given data.
3. Biochemical identification of bacteria; catalase, oxidase,

SuggestedReadings

1. Madigan,M.T.,andMartinko,J.M.(2014).Brockbiologyofmicroorganisms.PrenticeHallInternationalInc., New Jersey, 14th ed.
2. Moat,A.G.andFoster,J.W.(2002).Microbialphysiology.JohnWileyandSons,New York,4th ed.
3. Reddy,S.R.andReddy, S.M.(2005).Microbialphysiology.ScientificPublishers, India.
4. Gottschalk,G.(1986).Bacterialmetabolism. SpringerVerlag,NewYork, 2nd ed.
5. Stanier,R.Y.,Ingrahm,J.I.,Wheelis,M.L.andPainter,P.R.(1987).Generalmicrobiology.McMillanPress,London, 5th ed.
6. Willey,J.M.,Sherwood,L.M.andWoolverton,C.J.(2013).Prescott's microbiology.McGraw Hill, New York, 9th ed.

Additional ID-3 (AID-3):
Title of the paper: **PHYSIOLOGY OF MICROBES (THEORY)**
TOTALHOURS: 45 CREDITS: 03

UnitI:MicrobialGrowthandgrowth affecting factorsNo. of Hours: 12

Definitionsofgrowth;Batchculture;Continuousculture;Temperature and pH ranges of growth; Effect of pH, temperature, oxygen and Salt concentration ongrowth;Nutritionalcategoriesofmicroorganisms.

UnitII:NutrientUptakeandTransport No. of Hours: 08 Passive and facilitated diffusion; Primary and secondary active transport; Concept of uniport,symportandantiport.

UnitIII:Phototropy and Autotropy No. of Hours: 15 Phototrophic metabolism: Introduction, Groups of phototrophic microorganisms, Photosynthetic and accessory pigments, Anoxygenic vs. oxygenic photosynthesis with reference to photosynthesis in green bacteria and cyanobacteria.

UnitIV:Carbon catabolism No. of Hours: 10 Concept of aerobic and anaerobic respiration; Sugar degradation pathways: EMP, ED, Pentose phosphate pathway, TCA cycle, Electron transport chain: Components of respiratory chain, Comparison of mitochondrial and bacterial ETC, Electron transport phosphorylation, Uncouplers and inhibitors. Fermentation: Alcohol and Lactate fermentation,

Title of the paper: **PHYSIOLOGY OF MICROBES (PRACTICAL)**

TOTAL HOURS: 30 **CREDITS: 01**

1. Study and plot the growth curve of *E. coli* by turbidiometric and standard plate count methods.
2. Biochemical identification of bacteria; catalase, oxidase,

SuggestedReadings

1. Madigan,M.T.,andMartinko,J.M.(2014).Brockbiologyofmicroorganisms.PrenticeHallInternationalInc., New Jersey, 14th ed.
2. Moat,A.G.andFoster,J.W.(2002).Microbialphysiology.JohnWileyandSons,New York,4th ed.
3. Reddy,S.R.andReddy, S.M.(2005).Microbialphysiology.ScientificPublishers, India.
4. Gottschalk,G.(1986).Bacterialmetabolism. SpringerVerlag,NewYork, 2nd ed.
5. Stanier,R.Y.,Ingrahm,J.I.,Wheelis,M.L.andPainter,P.R.(1987).Generalmicrobiology.McMillanPress,London, 5th ed.
6. Willey,J.M.,Sherwood,L.M.andWoolverton,C.J.(2013).Prescott's microbiology.McGraw Hill, New York, 9th ed.

First year; Semester-II

Skill paper I:

Title of the paper:**MICROBIOLOGICAL ANALYSIS OF AIR AND WATER**

TOTAL HOURS: 30 **CREDITS: 02**

Unit I: Aeromicrobiology No. of Hours: 06
Bioaerosols; Air borne microorganisms (Bacteria, viruses and fungi) and their impact on human health and environment; Significance in food and pharma industries and operation theatres; Allergens.

Unit II: Collection and Analysis of Air Sample No. of Hours: 08
Bioaerosol sampling; Air samplers; Methods of sampling and analysis; Culture media for bacteria and fungi; Identification characteristics.

Unit III: Water Microbiology No. of Hours: 06
Water-borne pathogens; Water-borne diseases.

Unit IV: Microbiological Analysis of Water No. of Hours: 10
Sample collection, Treatment and safety of drinking (potable) water, Water purification, Methods to detect potability of water samples: (a) Standard qualitative procedure (MPN test) (b) Membrane filter technique and (c) Presence/absence tests

Suggested Readings

1. Da Silva, N., Taniwaki, M.H., Junqueira, V.C., Silveira, N., Nascimento, M.S., Gomes, R.A.R. Microbiological examination methods of food and water: A laboratory manual. CRC Press, Boca Raton.
2. Atlas, R.M. and Bartha, R. Microbial ecology: Fundamentals and applications. Benjamin/Cummings Science Publishing, USA.
3. Madigan, M.T., Martinko, J.M. and Parker, J. Brock biology of microorganisms. Prentice Hall, New Jersey.
4. Mitchell, R. and Gu, J.D. Environmental microbiology. Wiley-Blackwell, New Jersey.
5. Maier, R., Pepper, I. and Gerba, C. Environmental microbiology. Academic Press, San Diego.
6. Evans, G.M. and John, J.C.F. Environmental biotechnology: Theory and applications. John Wiley and Sons, New York.
7. Hurst, C.J., Crawford, R.L., Garland, J.L., Lipson, D.A., Mills, A.L. and Stetzenbach, L.D. Manual of environmental microbiology. ASM Press, Washington, D.C.

Second year; Semester-IV

Core paper IV:

Title of the paper: **MICROBIAL GENETICS (THEORY)**

TOTALHOURS: 60 **CREDITS: 04**

Unit I Genome Organization **No. of Hours: 10** Experimental evidences for nucleic acid as genetic material, Structure and types of DNA; Genome organization: *E. coli, Saccharomyces, Tetrahymena*

Unit II Plasmids **No. of Hours: 15**

Types of plasmids – F plasmid, R Plasmids, colicinogenic plasmids, Ti plasmids, linear plasmids, yeast- 2 μ plasmid, Plasmid replication and partitioning, Host range, plasmid-incompatibility, plasmid amplification, Regulation of copy number, curing of plasmids

Unit III Mechanisms of Genetic Exchange **No. of Hours: 10**

Transformation - Discovery, mechanism of natural competence, Artificial methods: chemical method, electroporation, microinjection, biolistic method (gene gun), liposome and virus mediated and Agrobacterium - mediated delivery
Conjugation - Discovery, mechanism, Hfr and F' strains, Interrupted mating technique and time of entry mapping

Unit IV Phage Genetics **No. of Hours: 15**

Features of T4 genetics, Genetic basis of lytic *versus* lysogenic switch of phage lambda, Transduction - Generalized transduction, specialized transduction, LFT & HFT lysates, Mapping by recombination and co-transduction of markers

Unit V Transposable elements **No. of Hours: 10**

Prokaryotic transposable elements – Insertion Sequences, composite and non-composite transposons, Replicative and Non replicative transposition, Mu transposon, Uses of transposons and transposition

Second year; Semester-IV

Core paper IV:

Title of the paper: **MICROBIAL GENETICS (PRACTICAL)**

TOTAL HOURS: 60 **CREDITS: 02**

1. Isolation of genomic and plasmid DNA from *E.coli*
2. Study different conformations of plasmid DNA through Agaraose gel electrophoresis.
3. Demonstration of Bacterial Conjugation
4. Demonstration of bacterial transformation and transduction

SuggestedReadings

1. Snustad,D.P.andSimmons,M.J.Principlesofgenetics.JohnWileyandSons,NewYork.
2. Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Scott, M.P., Bretscher, A., Ploegh, H. andMatsudaira,P.Molecularcellbiology. W.H.FreemanandCompany,NewYork.
3. Krebs,J.E.,Goldstein,E.S.andKilpatrick,S.T.Lewin'sgenes.JonesandBartlettLearningPublishers, Sudbury.
4. Synder,L.J.,Peters,E.,Henkins,T.M.andChampness,W.Moleculargeneticsofbacteria. ASM Press, Washington, D.C.
5. Maloy,S.R.,Cronan,J.E.andFreifelder,D.M.Microbialgenetics.JonesandBartlett Learning,Sudbury.
6. Sambrook,J.andRussell,D.W.Molecularcloning:Alaboratorymanual.ColdSpring HarborLab Press, NewYork.
7. Miller,J.H.Experimentsinmoleculargenetics.ColdSpringHarborLabPress,NewYork.
8. Karp,G.Cellandmolecularbiology:Conceptsandexperiments.JohnWileyandSons, NewYork.
9. Chaitanya, K.V.Cellandmolecularbiology:Alabmanual.PHILearning,NewDelhi.

Second year; Semester-IV

Additional ID-4 (AID-4):

Title of the paper: **GENETICS OF MICROBES (THEORY)**

TOTALHOURS: 45 CREDITS: 03

Unit I: Genome Organization No. of Hours: 10 Experimental evidences for nucleic acid as genetic material, Structure and types of DNA; Genome organization of*E. coli,*

Unit II: Plasmids No. of Hours: 15

Types of plasmids – F plasmid, R Plasmids, colicinogenic plasmids, Ti plasmids, linear plasmids, yeast- 2 µ plasmid, Plasmid replication and partitioning, Host range, plasmid-incompatibility, plasmid amplification, Regulation of copy number, curing of plasmids

Unit III: Mechanisms of Genetic Exchange No. of Hours: 10

Transformation - Discovery, mechanism of natural competence, Artificial methods: chemical method, electroporation, microinjection, biolistic method (gene gun); Conjugation - Discovery, mechanism, Hfr and F' strains, Interrupted mating technique and time of entry mapping; Transduction - Generalized transduction, specialized transduction, LFT & HFT lysates, Mapping by recombination and co-transduction of markers

Unit IV:Transposable elements No. of Hours: 10

Prokaryotic transposable elements – Insertion Sequences, composite and non-composite transposons, Replicative and Non replicative transposition, Mu transposon, Uses of transposons and transposition

Second year: Semester IV
Skill paper II
Title of paper: **MICROBIAL DIAGNOSIS IN HEALTH CLINICS**

TOTAL HOURS: 30 **CREDITS: 02**

Unit I: Importance of Diagnosis of Diseases No of Hours: 04
Bacterial, viral, fungal and protozoan diseases of various human body systems; Disease associated clinical samples for diagnosis.

Unit II: Collection of Clinical Samples No of Hours: 10
Procedure of collection of clinical samples (Oral cavity, throat, skin, blood, CSF, urine and faeces) and precautions required; Method of transport of clinical samples to laboratory and storage.

Unit III: Direct Microscopic Examination and Culture No of Hours: 06
Examination of sample by staining: Gram staining, Ziehl-Neelson staining for tuberculosis, Giemsa stained thin blood film for malaria; Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar; Distinct colony properties of various bacterial pathogens.

Unit IV: Serological and Molecular Methods No of Hours: 10
Serological methods: Agglutination, ELISA, Immunofluorescence; Nucleic acid based methods: PCR, Nucleic acid probes; Kits for rapid detection of typhoid, dengue and HIV, Swine flu.

Suggested Readings
1. Ananthanarayan, R. and Paniker, C.K.J. (2009). Textbook of microbiology. University Press Pvt. Ltd., 8th ed.
2. Brooks, G.F., Carroll, K.C., Butel, J.S., Morse, S.A. and Mietzner, T.A. (2013). Jawetz, Melnick and Adelberg's Medical microbiology. McGraw Hill Publication, 26th ed.
3. Randhawa, V.S., Mehta, G. and Sharma, K.B. (2009). Practicals and viva in medical microbiology. Elsevier India Pvt. Ltd., 2nd ed.
4. Tille, P. (2013). Bailey's and Scott's Diagnostic microbiology. Mosby, St. Louis, 13th ed.
5. Collee, J.G., Fraser, A.G., Marmion, B.P. and Simmons, A. (2007). Mackie and Mccartney Practical medical microbiology. Elsevier Publishers, 14th ed.

Second year; Semester-IV

Additional ID-4 (AID-4):

Title of the paper: **GENETICS OF MICROBES (PRACTICAL)**

TOTAL HOURS: 30 **CREDITS: 01**

1. Study different conformations of plasmid DNA through Agaraose gel electrophoresis.
2. Demonstration of Bacterial Conjugation.
3. Demonstration of bacterial transformation.
4. Demonstration of transduction.

SuggestedReadings

10. Snustad,D.P.andSimmons,M.J.Principlesofgenetics.JohnWileyandSons,NewYork.
11. Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Scott, M.P., Bretscher, A., Ploegh, H. andMatsudaira,P.Molecularcellbiology. W.H.FreemanandCompany,NewYork.
12. Krebs,J.E.,Goldstein,E.S.andKilpatrick,S.T.Lewin'sgenes.JonesandBartlettLearningPublishers, Sudbury.
13. Synder,L.J.,Peters,E.,Henkins,T.M.andChampness,W.Moleculargeneticsofbacteria. ASM Press, Washington, D.C.
14. Maloy,S.R.,Cronan,J.E.andFreifelder,D.M.Microbialgenetics.JonesandBartlett Learning,Sudbury.
15. Sambrook,J.andRussell,D.W.Molecularcloning:Alaboratorymanual.ColdSpring HarborLab Press, NewYork.
16. Miller,J.H.Experimentsinmoleculargenetics.ColdSpringHarborLabPress,NewYork.
17. Karp,G.Cellandmolecularbiology:Conceptsandexperiments.JohnWileyandSons, NewYork.
18. Chaitanya, K.V.Cellandmolecularbiology:Alabmanual.PHILearning,NewDelhi.

Syllabus of Botany Courses as per National Education Policy-2020
Department of Botany & Microbiology
H.N.B. Garhwal University
B.Sc. Botany

First Year- Semester I
Title of Paper: DIVERSITY OF LOWER PLANTS (THEORY)

Total No. of Lectures: 60 **Credits: 4**

U nit 1: Algae (12 Lectures)
General characteristics; Ecology and distribution; Range of thallus organization and reproduction; Classification of algae; Morphology and life-cycles of the following: *Nostoc, Chlamydomonas, Oedogonium, Vaucheria, Fucus, Polysiphonia*. Economic importance of algae

U nit 2: Fungi (14 Lectures)
Introduction- General characteristics, ecology and significance, range of thallus organization, cell wall composition , nutrition, reproduction and classification; True Fungi- General characteristics, ecology and significance, life cycle of *Rhizopus* (Zygomycota) *Penicillium, Alternaria* (Ascomycota), *Puccinia, Agaricus* (Basidiomycota); Symbiotic Associations- **Lichens**: General account, reproduction and significance; Mycorrhiza: ectomycorrhiza and endomycorrhiza and their significance

Unit 3: Introduction to Archegoniate (14 Lectures)
Unifying features of archegoniates, Transition to land habit, Alternation of generations.
Bryophytes
General characteristics, adaptations to land habit, Classification, Range of thallus organization. Classification (up to family), morphology, anatomy and reproduction of *Marchantia* and *Funaria*. (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of *Sphagnum*.

Unit 4: Pteridophytes (12 Lectures)
General characteristics, classification, Early land plants (*Cooksonia* and *Rhynia*). Classification (up to family), morphology, anatomy and reproduction of *Selaginella, Equisetum* and *Pteris*. (Developmental details not to be included). Heterospory and seed habit, stelar evolution. Ecological and economical importance of Pteridophytes.

Unit 5: Gymnosperms (8 Lectures)
General characteristics, classification. Classification (up to family), morphology, anatomy and reproduction of *Cycas* and *Pinus*. (Developmental details not to be included). Ecological and economical importance.

PRACTICAL **Credits: 2**

4. Study of vegetative and reproductive structures of *Nostoc, Chlamydomonas* (electron micrographs), *Oedogonium, Vaucheria, Fucus** and *Polysiphonia* through temporary preparations and permanent slides. (* *Fucus* - Specimen and permanent slides)
5. *Rhizopus* and *Penicillium*: Asexual stage from temporary mounts and sexual structures through permanent slides.
6. *Alternaria*: Specimens/photographs and tease mounts.
7. *Puccinia*: Herbarium specimens of Black Stem Rust of Wheat and infected Barberry leaves; section/tease mounts of spores on Wheat and permanent slides of both the hosts.
8. *Agaricus*: Specimens of button stage and full grown mushroom; Sectioning of gills of Agaricus.
9. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose)
10. Mycorrhiza: ecto mycorrhiza and endo mycorrhiza (Photographs)
11. *Marchantia*- morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, l.s. sporophyte (all permanent slides).
12.. *Funaria*- morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, l.s. capsule and protonema.
13. *Selaginella*- morphology, w.m. leaf with ligule, t.s. stem, w.m. strobilus, w.m. microsporophyll and megasporophyll (temporary slides), l.s. strobilus (permanent slide).
14. *Equisetum*- morphology, t.s. internode, l.s. strobilus, t.s. strobilus, w.m. sporangiophore, w.m. spores (wet and dry)(temporary slides); t.s rhizome (permanent slide).
15. *Pteris*- morphology, t.s. rachis, v.s. sporophyll, w.m. sporangium, w.m. spores (temporary slides), t.s. rhizome, w.m. prothallus with sex organs and young sporophyte (permanent slide).
16. *Cycas*- morphology (coralloid roots, bulbil, leaf), t.s. coralloid root, t.s. rachis, v.s. leaflet, v.s. microsporophyll, w.m. spores (temporary slides), l.s. ovule, t.s. root (permanent slide).
17. *Pinus*- morphology (long and dwarf shoots, w.m. dwarf shoot, male and female), w.m. dwarf shoot, t.s. needle, t.s. stem, , l.s./t.s. male cone, w.m. microsporophyll, w.m. microspores (temporary slides), l.s. female cone, t.l.s. & r.l.s. stem (permanent slide).

Suggested Readings

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore. 4th edition.
5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology. Tata McGraw

Hill, Delhi, India.
6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.
7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad

SKILL PAPER: MUSHROOM CULTIVATION TECHNOLOGY

Total No. of Lectures: 30 **Credits: 2**

Unit 1: (5 Lectures)
Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - *Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus*.

Unit 2: (5 Lectures)
Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.

Unit 3: (7 Lectures)
Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.

Unit 4: (8 Lectures)
Storage and nutrition : Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.

Unit 5: (5 Lectures)
Food Preparation_: Types of foods prepared from mushroom. Research Centres - National level and Regional level._Cost benefit ratio - Marketing in India and abroad, Export Value.

Suggested Readings

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.

3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

First Year- Semester II
Title of Paper: MICROBIOLOGY AND PLANT PATHOLOGY (THEORY)

Total No. of Lectures: 60 **Credits: 4**

Unit 1: (8 Lectures)
History and scope of Microbiology
General account, distribution and classification of microorganisms.

Unit 2: (12 Lectures)
Viruses – Discovery, general structure, replication (general account), DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance;

Unit 3: (12 Lectures)
Bacteria – Discovery, General characteristics and cell structure; Reproduction – vegetative, asexual and recombination (conjugation, transformation and transduction); Economic importance. Role of microorganisms in Nitrogen metabolism

Unit 4: (14 Lectures)
History of Plant Pathology. Modes of Infection and general symptoms, physiology of parasitism, defense mechanism in plants, role of environment in disease development. Control measures of plant diseases. Disease resistance in plants.

Unit 5: (14 Lectures)
General symptoms and control measures for the following plant diseases: Citrus canker, TMV, wilt of tomato, bacterial blight of rice, mosaic of sugarcane and little leaf of brinjal. Late blight of potato, Wilt of *Cajanus cajan*, Loose smut of Wheat, Covered smut of Barley, Green ear disease of bajra, downy mildew of crucifers, rusts of pea and linseed, smut of bajra,

PRACTICAL **(Credits 2)**

1. EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle.
2. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule.
3. Gram staining
4. Study of plant diseases with help of infected plant specimen - TMV, citrus canker, little leaf of brinjal, loose smut of wheat, downy mildew of crucifers, rust of pea, smut of bajra.

Suggested Readings

1. Brock Biology of Microoranisms, 13th edition (2012)
2. Stainier, R.Y. General Microbiology 5th edition (2009) Mc Millan Press Ltd., Hound Mills
3. Talaro, K.P., Chess, B., 2011. Foundation in Microbiology. 8th edition. McGraw-Hill
4. Prescott, Harley and Klein's Microbiology 7th edition (2008). Mc GRAW Hill. Singapore
5. Agrios, G.N., 1988. Plant Pathology, Academic Press, London.
6. Lucas, John, A., 1998. Plant Pathology and Plant Pathogens, Wiley-Blackwell, CRC Press.
7. Singh, R.S. Plant diseases, 9th edition (2009). Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi

Second Year- Semester III
Title of Paper: PLANT PHYSIOLOGY AND BIOCHEMISTRY (THEORY)

Total No. of Lectures: 60 **Credits: 4**

Unit 1:
Plant-water relations (8 Lectures)
Importance of water, water potential and its components; Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.

Unit 2: Mineral nutrition (8 Lectures)
Essential elements, macro and micronutrients; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps. Sugar translocation

Unit 3: Photosynthesis (12 Lectures)
Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation; Photorespiration.

Unit 4: Respiration (10 Lectures)
Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.

Unit 5: Plant growth regulators (12 Lectures)
Discovery and physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene.
Plant response to light and temperature (6 Lectures)
Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery and structure), red and far red light responses on photomorphogenesis; Vernalization.

Unit 6: (10 Lectures)
Enzymes**:** Structure and properties; Mechanism of enzyme action, coenzymes, allosteric enzyme, isozymes, enzyme inhibition.
Biologically important molecules: Carbohydrates, Amino acids, Proteins and Lipids.

PRACTICAL **(Credits 2)**

1. Determination of osmotic potential of plant cell sap by plasmolytic method.
2. To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
3. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.
4. Demonstration of Hill reaction.
5. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.
6. To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.
7. Comparison of the rate of respiration in any two parts of a plant.
8. Separation of amino acids by paper chromatography.

Demonstration experiments (any four)

1. Bolting.
2. Effect of auxins on rooting.
3. Suction due to transpiration.
4. R.Q.
5. Respiration in roots.

Suggested Readings

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
4. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007) Biochemistry (Sixth Edition) W.H. Freman &
Company, New York.
5. Cox, M.M. and Nelson DL (2004) Lehniger Principle of Biochemistry (Third Edition) MacMillan Worth Publishers.
6. Dennis, D.T. & Turpin, D.H. (1993) Plant Physiology, Biochemistry and Molecular Biology. Longman Scientific & Technical, England.

MULTI-DISCIPLINARY COURSE I: FLORICULTURE
Total No. of Lectures: 30 **(Credits 2)**

Unit 1: (2 Lectures)
Introduction: History of gardening; Importance and scope of floriculture and landscape gardening.

Unit 2: (8 Lectures)
Nursery Management and Routine Garden Operations: Sexual and vegetative methods of propagation; Soil sterilization; Seed sowing; Pricking; Planting and transplanting; Shading; Stopping or pinching; Defoliation; Wintering; Mulching; Topiary; Role of plant growth regulators.

Unit 3: (4 Lectures)
Ornamental Plants: Flowering annuals; Herbaceous perennials; Divine vines; Shade and ornamental trees; Ornamental bulbous and foliage plants; Cacti and succulents; Palms and Cycads; Ferns and Selaginellas; Cultivation of plants in pots; Indoor gardening; Bonsai.

Unit 4: (8 Lectures)
Principles of Garden Designs: English, Italian, French, Persian, Mughal and Japanese gardens; Features of a garden (Garden wall, Fencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India.
Landscaping Places of Public Importance: Landscaping highways and Educational institutions.

Unit 5: (8 Lectures)
Commercial Floriculture: Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life; Cultivation of Important cut flowers (Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold,Rose, Lilium, Orchids).
Diseases and Pests of Ornamental Plants.

Suggested Readings
1. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

Second Year- Semester IV
Title of Paper: PLANT TAXONOMY AND PLANT EMBRYOLOGY (THEORY)

Total No. of Lectures: 60 **Credits: 4**

U nit 1: Introduction to plant taxonomy (10 Lectures)
Identification, Classification, Nomenclature.
Taxonomic hierarchy

Ranks, categories and taxonomic groups
Identification
Functions of Herbarium, important herbaria and botanical gardens of the world and India;
Documentation: Flora, Keys: single access and multi-access
Taxonomic evidences from palynology, cytology, phytochemistry and molecular data.

Unit 2: Botanical nomenclature (12 Lectures)
Principles and rules (ICN); ranks and names; binominal system, typification, author citation, valid publication, rejection of names, principle of priority and its limitations.
Classification: Types of classification-artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series).
Biometrics, numerical taxonomy and cladistics
Characters; variations; OTUs, character weighting and coding; cluster analysis; phenograms, cladograms (definitions and differences).

Unit 3: Taxonomy, important distinguishing characters, classification, and economic importance of the following families: (10 Lectures)
Ranunculaceae, Papaveraceae, Caryophyllaceae, Malvaceae, Rutaceae, Fabaceae, Apiaceae, Solanaceae, Apocyanaceae, Asclepidiaceae, Acanthaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, Poaceae.

Unit 4: Structural organization of flower (14 Lectures)
Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization and ultrastructure of mature embryo sac.
Pollination and fertilization: Pollination mechanisms and adaptations; Double fertilization; Seed-structure appendages and dispersal mechanisms.

Unit 5: Embryo and endosperm (14 Lectures)
Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship.
Apomixis and polyembryony: Definition, types and practical applications.

PRACTICAL **(Credits 2)**
1. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):Brassicaceae -Brassica, Alyssum / Iberis; Asteraceae -Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax; Solanaceae -Solanum nigrum, Withania; Lamiaceae -Salvia, Ocimum; Liliaceae -Asphodelus / Lilium / Allium.
2. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).
3. Taxonomic treatment of plant species belonging to families mentioned in the syllabus.

4. Study of taxonomic terminology
5. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).
6. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.
7. Female gametophyte: Polygonum (monosporic) type of Embryo sac Development (Permanent slides/photographs).
8. Ultrastructure of mature egg apparatus cells through electron micrographs.
9. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).
10. Dissection of embryo/endosperm from developing seeds.
11. Calculation of percentage of germinated pollen in a given medium.

Suggested Readings

1. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.
2. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.
3. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.

MULTI-DISCIPLINARY COURSE: ETHNOBOTANY

Total No. of Lectures: 30 **(Credits 2)**

Unit 1: (6 Lectures)

Ethnobotany

Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.

Unit 2: (6 Lectures)

Methodology of Ethnobotanical studies

a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.

Unit 3: (07 Lectures)

Role of ethnobotany in modern Medicine

Medico-ethnobotanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) Azadiractha indica b) Ocimum sanctum c) Vitex negundo. d) Gloriosa superba e) Tribulus terrestris f) Pongamia pinnata g) Cassia auriculata h) Indigofera tinctoria. Role of ethnobotany in modern

medicine with special example Rauvolfia sepentina, Trichopus zeylanicus, Artemisia,Withania.

Unit 4: (03 Lectures)
Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management).

Unit 5: (8 Lectures)
Ethnobotany and legal aspects
Ethnobotany as a tool to protect interests of ethnic groups. Sharing of wealth concept with few examples from India. Biopiracy, Intellectual Property Rights and Traditional Knowledge.

Suggested Readings
1) S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2) S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981
3) Lone et al,. Palaeoethnobotany
4) S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, _Lucknow, India.
5) S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.
6) Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – _Chichester
7) Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah._8) Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine – INA –SHREE Publishers, Jaipur-1996_9).

INDIAN KNOWLEDGE SYSTEM-I: MEDICINAL PLANTS CULTIVATION

Total No. of Lectures: 30 **(Credits 2)**

Unit 1: (02 Lectures)
History, Scope and Importance of Medicinal Plants. Indigenous Medicinal Sciences;

Unit 2: (08 Lectures)
Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations.

Unit 3: (05 Lectures)
Conservation of endangered and endemic medicinal plants. Definition: endemic and endangered medicinal plants, Red list criteria; In situ conservation: Biosphere reserves, sacred groves, National Parks; Ex situ conservation: Botanic Gardens, Ethnomedicinal plant

Gardens.

Unit 4: (05 Lectures)
Propagation of Medicinal Plants: Objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

Unit 5: (10 Lectures)
Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethnobotany. folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases.

Suggested Readings
1. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. _Agrobios, India.

Third Year- Semester V
Title of Paper: PLANT ECOLOGY AND ENVIRONMENTAL POLLUTION (THEORY)

Total No. of Lectures: 60 **Credits: 4**

Unit 1: (10 Lectures)
Introduction to ecology
Abiotic environment: Atmosphere, Temperature, Water, Light and Soil (structure and soil profile)

Unit 2: (12 Lectures)
Biotic environment: Interaction between plants, animals and man; Interactions among plants growing in a community; Interactions among plants and microorganisms. Shelford law of tolerance. Adaptation of hydrophytes and xerophytes.

Unit 3: (12 Lectures)
Plant communities
Characters; Ecotone and edge effect; Ecological Succession; Processes and types.
Phytogeography (3 Lectures)
Principle biogeographical zones; Endemism

Unit 4:

Ecosystem (14 Lectures)
Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Biogeochemical cycling; Cycling of carbon, nitrogen and Phosphorous

Unit 5: (12 Lectures)
Environmental pollution: Water Pollution: Sources and kinds, impact of pollution on aquatic ecosystems, eutrophication; Air Pollution: Sources and kinds, impact of air pollution on plants and ecosystems. Soil Pollution: Sources and kinds, impact on plants and ecosystems

PRACTICAL **(Credits 2)**
1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.
2. Determination of pH, and analysis of two soil samples for carbonates, chlorides, nitrates, sulphates, organic matter and base deficiency by rapid field test.
3. Comparison of bulk density, porosity and rate of infiltration of water in soil of three habitats.
4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each).
(b)Study of biotic interactions of the following: Stem parasite (Cuscuta), Root parasite (Orobanche), Epiphytes, Predation (Insectivorous plants)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method. (species to be listed)
6. Quantitative analysis of herbaceous vegetation in the college campus for frequency and comparison with Raunkiaer's frequency distribution law.

Suggested Readings
1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
3. Odum and Barrett, Thomson, Ed. Brooks/Cole, Fundamentals of Ecology, Cengage Learning
4. Singh, Singh and Gupta Ed., Ecology, Environment and Resources Conservation, , Anamaya Pub., New Delhi

MULTI-DISCIPLINARY COURSE II: BEE FARMING

Total No. of Lectures: 30 **(Credits 2)**

Unit 1: (6 Lectures)

1. Apiculture: An introduction; traditional, modern and commercial beekeeping.
2. History and future prospects of apiculture.
3. Outline of bee keeping occupation.
4. Importance of apiculture, honeybee products and their values.

Unit 2: (7 Lectures)
5. Brief account on morphology of honeybee body parts, colony organization and division of labour.
6. Species of honey bees and their nesting behaviour.
7. Structure of bee hive and other beekeeping equipments.

Unit 3: (5 Lectures)
8. Seasonal management of honeybees.
9. Swarming, absconding and robbing and methods to check them.

Unit 4: (6 Lectures)
10.Multiplication of honeybee colonies and their migration.
11.Bee diseases, enemies and their control.

Unit 5: (6 Lectures)
12.Bee flora
13.Bees and pollination.
14.Harmful effects of insecticides on honey bees.

Suggested Readings

1. Abrol, D.P. (1997). Bees and beekeeping in India. Kalyani Publishers, Ludhiana, India.
2. Atwal, A.S. (2001). Essential of Bee Keeping and Pollination. Kalyani Publishers, Ludhiana, India.
3. Atwal, A.S. (2001). The World of Honeybees. Kalyani Publishers, Ludhiana, India.
4. Mishra, R.C. (1995). Honeybees and their Management. ICAR Publications, New Delhi.
5. Tiwari P, Tiwari, J.K. and Rawat, D.S. (2021). Maun Paalan: Parvatiya mahilaon ke liye ek sah-vyawsaay. P.K. Publishers & Distributers, Delhi.
6. Winston, M.C. (1987). The Biology of the Honeybee. Harward University Press, Cambridge.
7. Sammataro, D. and Avitabile, A. (1998). Vth Edition 2021. The beekeeper's handbook. Comstock Publishing Associates, NY.
8. Belsare, D. K., Singh R. K., Belsare, S. D. and Deshmukh, R. H. (2019) A textbook of Apiculture (Beekeeping). Himalaya Publishing House.

INDIAN KNOWLEDGE SYSTEM-I: WILD EDIBLES

Total No. of Lectures: 30 **(Credits 2)**

Unit 1: (Lecture 10)
Introduction, History, Diversity, Importance: present status of wild edible plants in Uttarakhand. Characteristics and ethno botanical uses, sources, nutritive value, bioactivities and health benefits of wild edibles.

Unit 2: (Lecture 12)
Taxonomic Features of important wild edibles plants of Garhwal Himalaya: *Aegle marmelos* (Bael), *Bauhinia variegate* (kachnar), *Berberis asiatica* (Kingod), *Carissia carandas* (karonda), *Cornus capitata* (Bhamor*), Embilica officinalis* (Amla*), Ficus palmata* (Bedu), *Hippophae salicifolia* (Sea buckthorn), *Myrica esculenta* (Kaphal), *Prunus cerasoides* (panyan), *Pyracantha crenulata* (Ghingharu), *Pyrus pashia* (Melu), *Rubus ellipticus* (Hisar or Hisalu), *Spondias pinnata* (Amoda), *Ziziphus mauritiana* (Ber) etc.

Unit 3: (Lecture 08)
Collection, storage, preservation, processing, value addition and marketing of wild edibles; Conservation measures: integrated approach for conservation and sustainability of wild edibles.

Suggested Readings

AOAC. 1984. Official methods of analysis of the Association of Official Analytical Chemists. AOAC, Virginia.

Badhwar R.L. and Fernandes R.R. 1969: Edible Wild Plants of Himalayas, Delhi.

C Gopalan, BV Ramshastri, S C Balasubramaniam, 1989, Nutritive Value of Indian Foods National Institute of Nutrition, Hyderabad.

Rakesh Shah. Edible Plants of North West Himalaya. (Uttarakhand): M/s Bishen Singh Mahendra Pal Singh.

Rangana S.C. 1979. Manual of analysis of fruit and vegetable products. Tata McGraw Hill Publishing Company Limited, New Delhi.

Shabnum Shaheen, Mushtaq Ahmad, and Nidaa Haroon: Edible Wild Plants: An alternative approach to food security..

Sharma B.D. 2014. Himalayan edible medicinal plants: Science and traditional wisdom.

Bishen Singh Mahendra Pal Singh. Singh H.B. and Arora R.K. 1978. Wild edible plants of India. New Delhi, India: ICAR.

Third Year - Semester VI
Title of Paper: CYTOGENETICS AND EVOLUTIONARY PROCESSES (THEORY)

Total No. of Lectures: 60 **Credits: 4**

Unit 1: (12 Lectures)
Cell as a unit of Life: cell theory, germplasm theory.
Ultrastructure of plant cell; Cell Organelles- Mitochondria- Structure, marker enzymes, composition; Semiautonomous nature; Symbiont hypothesis; Proteins synthesized within mitochondria; mitochondrial DNA; Chloroplast_ Structure, marker enzymes, composition; semiautonomous nature, chloroplast DNA;
ER, Golgi body & Lysosomes; Peroxisomes and Glyoxisomes. Cell Wall and Cell Membrane- structure, functions, fluidity and models of membrane. Selective permeability of the membrane;

Unit 2: (12 Lectures)
Nucleus: Nuclear Envelope- structure of nuclear pore complex, chromatin; molecular organization, DNA packaging in eukaryotes, euchromatin and heterochromatin; nucleolus and ribosome structure (brief)
Cell cycle: mitosis, meiosis; genetic significance of Meiosis.
Mendel's laws of inheritance: Law of segregation, law of independent assortment, deviations from Mendel's laws (Neo-Mendelism)
Interaction of genes: Intragenic and intergenic interactions, incomplete dominance, lethal genes, complementary genes, supplementary genes, inhibitory genes, duplicate genes, epistatic genes

Unit 3: (8 Lectures)
Linkage and crossing over: Interrelationships and importance, crossing over and meiosis, cytological basis of crossing over, crossing over and linkage map.
Sex determination: Bases of sex determination, chromosome theory of sex determination, sex determination in plants.
Synthetic theory of evolution

Unit 4: (10 Lectures)
Chromosome rearrangements: meiotic configurations and genetic consequences of deletion, duplication, inversion and translocation; permanent translocation heterozygosity
Sources and consequences of numerical variations in chromosomes: Aneuploidy, monosomics, trisomics, nullisomics; Polyploidy-autopolyploids, allopolyploids, segmental allopolyploids, autoallopolypolids.
Mutation and mutagens: Types of mutation, molecular basis of mutation, physical and chemical mutagens and mechanism of their action

Unit 5: (8 Lectures)
Karyotype: Concept and components of karyotype, trends of karyotype evolution,

karyotypic changes in speciation and evolution of plant species
Gene mapping: Physical and genetic maps- deletion, linkage, somatic cell fusion and in situ hybridization, methods of gene mapping

Unit 6: (10 Lectures)
Multiple alleles and multiple genes: Multiple allelism- ABO and Rh blood groups in man, eye colour in Drosophila, self sterility in plants; multiple gene inheritance- kernel colour in wheat, skin colour in human beings; quantitative characters.
Cytoplasmic inheritance: Maternal influence- coiling in snail shells, kappa particles in Paramecium, plastid inheritance in Mirabilis jalapa, petites in fungi.

PRACTICAL **Credits 2**

1. To study prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron micrographs.
2. Study of the photomicrographs of cell organelles
3. To study the structure of plant cell through temporary mounts.
4. Study of mitosis and meiosis (temporary mounts and permanent slides).
5. Study the effect of temperature, organic solvent on semi permeable membrane.
6. Demonstration of dialysis of starch and simple sugar.
7. Study of plasmolysis and deplasmolysis on Rhoeo leaf.
8. Study the structure of nuclear pore complex by photograph (from Gerald Karp)Study of special chromosomes (polytene & lampbrush) either by slides or photographs.
9. Study DNA packaging by micrographs.
10. Preparation of the karyotype and ideogram from given photograph of somatic metaphase chromosome.
11. Mendel's laws through seed ratios. Laboratory exercises in probability and chisquare.
12. Chromosome mapping using point test cross data.
13. Pedigree analysis for dominant and recessive autosomal and sex linked traits.
14. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4).

Suggested Readings

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
5. Gardner EJ, Simmons MJ, Snustad DP (2008). Principles of Genetics. 8th Ed. WileyIndia.
6. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India. 5th edition.

7. Klug WS, Cummings MR, Spencer, C, Palladino, M (2011). Concepts of Genetics, 10th Ed., Benjamin Cummings
8. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freeman and Co., U.S.A. 10th edition.
9. Pierce BA (2011) Genetics: A Conceptual Approach, 4th Ed., Macmillan Higher Education Learning.
10. Stebbins, G.L., Variation and Evolution in Plants.
11. Swanson, C. P., Mertz, T.F. and Young, W.J., Cytogenetics: The Chromosomes in Division, Inheritance and Evolution (2nd Edn).

MULTI-DISCIPLINARY COURSE II: SERICULTURE

Total No. of Lectures: 30 **Credits: 2**

Unit 1: (5 Lectures)
Introduction to Sericulture: Origin and history of sericulture. Silk route and map of India and World; Environmental impact of sericulture: Employment generation in sericulture and role of women in sericulture.

Unit 2: (5 Lectures)
Textile fibers: Natural and Synthetic fibers: Advantage of silk fiber over other fibers: International demand of silk. Function Central Silk Board; Role of State Department of Sericulture (Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal).

Unit 3: (8 Lectures)
Silkworm taxonomy & life-cycle**,** Silkworm morphology and anatomy, Silkworm crop protection, diseases and pests, Silkworm rearing. Methods of egg storage, incubation. Industrial seed, reproductive seed, certified seed.

Unit 4: (7 Lectures)
Biology of Mulberry: Botanical description of mulberry. Economic importance of mulberry Plant; Morphology and anatomy of mulberry plant, Mulberry crop protection, diseases and pest management.

Unit 5: (5 Lectures)
Non- mulberry Sericulture: Scope, mulberry vs. non-mulberry sericulture; Non-mulberry silkworms (Tasar, Muga, Eri silk) and their distribution in India and other countries. Taxonomy of food plants of non-mulberry silkworms: Life cycle of Tasar, Eri and Muga silkworm.

Suggested Readings

1. Ganga, G., And J. Sulochana Chetty. (1991) An Introduction To Sericulture. Oxford & Ibh

Publishing Company.
2. Hasao Aruga (1994). Principles Of Sericulture (Translated From Japanese) Oxford & Ibh Publishing Co., Pvt. Ltd. New Delhi.
3. Kichisaburo M. (1997) Moriculture – Science Of Mulberry Cultivation. Oxford & Ibh
4. Krishnaswami, S.; Narasimhanna, M.N.; Suryanarayan, S.K And Kumararaj, S. (1973) Sericulture Manual-2 - Silkworm Rearing. Agriculture Service Bulletin, Fao, Rome.
5. Mulberry Crop Protection, Central Silk Board, Bangalore, India
6. Rajanna, L., Das, P.K., Ravindran, S., Bhogesha, K., Mishra, R.K., Singhvi, N.R., Katiyar, R.S. And Jayaram, H. (2005) Mulberry Cultivation And Physiology. Central Silk Board, Bangalore

Fourth Year- Semester VII
Title of Paper: COMPARATIVE STUDIES OF CRYPTOGAMS (THEORY)

Total No. of Lectures: 60 **Credits: 4**

Unit 1: Algae
Classification (Fritsch's system) of algae and general characteristics of major classes; Pigmentation and storage products; Thallus organization and evolutionary tendencies; Reproduction and life history types with reference to Chlorophyceae, Phaeophyceae, Rhodophyceae and Cyanophyceae

Unit 2: Fungi
General features of fungi and their classification; Structure, reproduction and life cycle of representative classes of fungi; Types of fungal spores and mode of their liberation; Evolutionary trends in fungi; Economic importance of fungi

Unit 3: Bryophytes
Life histories of bryophytes with reference to *Cyathodium, Notothylus, Sphagnum* and *Polytrichum*; Vegetative propagation in bryophytes; General account of evolution of sporophyte.

Unit 4: Pteridophytes
Classification of pteridophyta; Stelar evolution in pteridophyta ; Life history of *Psilotum, Isoetes, Adiantum, Ophioglossum, Marselia* .

PRACTICAL **Credits 2**

1. Study of representative genera of Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina.

2. Symptomatology of at least one diseased specimen of plant phogens belonging to various fungal classes i.e. Mastigomycotina,Zygomycotina, acomycotina, basidiomycotina and deuteromycotina,
3. Morphological study of representative members of algae: *Microcystis, Lyngbya, Cylindrospermum, Gloeotrichia, Scytonema, Pandorina, Eudorina, Scendesmus, Pediastrum, Hydrodictyon, Ulva, Enteromorpha, Drapernaldiopsis, Stigeoclonium, Fritschiella, Coleochaete, Bulbochaete, Cosmarium, Caulerpa, Nitella, Dictyota, Gelidium, Gracillaria, Batrachospermum* and *Polysiphonia*.
4. Study and identification with suitable preparations of bryophytes- *Ricciocarpus, Targionia, Cyathodium, Plagiochasma, Asterella (Fimbriaria), Dumortiera, Sewardiella, Pellia, Fossombronia, Porella, Calobryum, Notothylas, Sphagnum, Polytrichum* and *Funaria*,
5. Study and identification with suitable preparations of the following pteridophytes *Psilotum, Isoetes, Ophioglossum, , Osmunda,, Polypodium, Azolla, Salvinia* and important fossil types.

Suggested readings:

1. Gangulee, H.C. and Kar, A.K., 2011, College Botany Vol. II Algae+Fungi+Brophyta+ Pteridophyta) , New Central Book Agency, Kolkata
2. Singh, Pande, Jain, 2010, A Text Book of Botany (Algae+Fungi+Brophyta+Pteridophyta) , Pub.Rastogi Publication, Meerut
3. Rashid, A, 2011, An Introduction to Pteridopyta , 2nd edition, (Reprint), Pub. Vikas Publishing House Pvt. Ltd., Noida.

Fourth Year- Semester VIII
Title of Paper: COMPARATIVE STUDIES OF PHANEROGAMS (THEORY)

Total No. of Lectures: 60 **Credits: 4**

Section A: Gymnosperm
1. General account of morphology and reproduction of the following: *Zamia, Ginkgo, Biota* and *Gnetum*.
2. General account of *Williamsonia* and *Pentaxylon*.
3. Phylogenetic trends in Gymnosperms
4. Distribution of living Gymnosperms in India

Section B: Angiosperm
1. Classification of Angiosperms (Hutchinson) and general account of numerical and chemotaxonomy
2. Distinguishing characters of the following families and their economic importance: Annonaceae, Rutaceae, Asteraceae, Convolvulaceae, Scrophulariaceae, Verbenaceae, Polygonaceae, Euphorbiaceae, Zingiberaceae, Liliaceae, Cyperaceae
3. Embryology: General account of polyembryony, apomixis and experimental embryology

with reference to anther and embryo culture

PRACTICAL **Credits 2**

1. Study and identification with suitable preparations of the following gymnosperms: *Cycas, Ginkgo, Abies, Cedrus, Cryptomeria, Cupressus, Podocarpus, Cephalotaxus, Araucaria, Taxus*, and *Gnetum*.
2. Palaeobotany: Study of available fossil flora through specimens and slides, etc.
3. Taxonomy

a. Identification and description of locally available plants belonging to families included in the syllabus from fresh specimens, herbarium or preserved materials. After identification up to family level any suitable regional Flora may be provided for generic identification if required.

b. Description of a species based on various specimens to study intra specific variation.

c. Studies to find out the location of key characters and preparation of keys at generic level.

d. Field trips, compilation of field notes, the preparation of herbarium sheets and submission of herbarium and museum specimens and/or live potted specimens of taxonomic interest and submission of the excursion report.

Suggested readings:

1. Singh, V. and Jain, D.K., Taxonomy of angiosperms. Rastogi Publication, Meerut
2. Sporne, K.R., Morphology of Gymnosperms, B.I. Publication, New Delhi
3. Bhojwani, S.S. and Bhatnagar, S.P., Embryology of Angiosperms, Vikash Publishing House,
New Delhi
4. Singh, Gurucharan, Plant Systematics- Theory and Practices, Oxford and I.B.H. Publishing Co. New Delhi
5. Judd,W.S.,Christopher,S., Campbell.,Kellogg,A.E.,Stevens,P.F.,1999.Plant Systematics:A Phylogenetic Approach. Sinauer Associates Inc. Publishers.
6. Simpson M. G. 2006, Plant Systematics. Elsevier Academic Press.

Department of Environmental Sciences
H.N.B. Garhwal University (A Central University)
Srinagar (Garhwal) -246174, Uttarakhand

19 February, 2020

Minutes of the Meeting of the Board of Studies (BoS) in Environmental Sciences

The meeting of the Board of Studies (BoS) in Environmental Sciences was held on 19 February 2020 at the Department of Environmental Sciences, HNB Garhwal University, Chauras Campus. The Chairman welcomed all the members of BoS in the meeting.

The following members were present:
1. Mr. Rajkamal Singh, HoD, Environmental Sciences
2. Prof. R.C. Sharma, External Expert, Member
3. Prof. H.B.S. Chauhan, Member
4. Prof. O.P. Gusain, Member

The BoS took the following decisions unanimously.

The minutes of the previous meeting of BoS held on 16.09.2019 is approved

Item No. 1. To consider application of Mr. Akash Deep, Research Scholar regarding approval of new Supervisor in place of Prof. Ramesh C. Sharma who has retired

Resolution: The BOS took note of the application dated 19.02.2020 of Akash Deep, Research Scholar who completed the Pre-Ph.D. Course in 2018. He has requested to allot him new supervisor from within the Department. A letter of consent to supervise has been given by Dr. Vidhu Gupta, Assistant Professor, (Annexure 1) who is already a registered supervisor.

The BoS recommends allotment of Dr. Vidhu Gupta as supervisor of Akash Deep.

Item No. 2. To consider application of Mr. Rajkamal Singh (HOD, Environmental Sciences) regarding his Pre-Ph.D. course done by him in 2014

Resolution: The BoS taking note of the application dated 19.02.2020 of Mr. Rajkamal Tamta regarding adjustment of the time period of his Pre-Ph.D. course against his Accumulated Earned Leaves (Annexure 2).

The BoS recommends adjustment of 6 months period against his Earned Leaves (if available) so that he may pursue Ph.D. work for career advancement.

Item No. 3. To consider the Progress Reports of Ms. Lalita Bisht, Research Scholar

Resolution: The BoS approves the following progress reports of Ms. Lalita Bisht (Annexure 3)

(i) Progress Report (Nov 2017-April 2018)
(ii) Progress Report (May 2018-Oct 2018)
(iii) Progress Report (Nov 2018-April 2019)
(iv) Progress Report (May 2019-Oct 2019)

Item No. 4. Any other issue with the permission of the chair

Resolution: The HOD put the office order No. Acad/2020/49 Dated 11.02.2020 for consideration.

The BoS resolved to include two credit course on "Research and Publication Ethics (RPE)" as core course in Pre-Ph.D. progress (Annexure 4). The required revisions in the syllabus of Pre-Ph.D. programme may be made as per the direction from the University in this regard.

1641
16/6/2020

98
23/06/2020
23/7/2020

Prof. R.C. Sharma
External Expert, Member
19/2/2020

Prof. O.P. Gusain
Member
19.02.2020

Prof. H.B.S. Chauhan,
Member

Forwarded
22.02.2020.

DEAN
School of Life Sciences
H.N.B. Garhwal University

DEAN (Life Science).

19/2/2020
Mr. Rajkamal Singh,
HoD, Environmental Sciences
Department of Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

Approval for Honble Vice chancellor.

पाठ्यक्रम समिति पर्यावरण विज्ञान की बैठक 19.2.20 BOS में लिये गये निर्णयों में से मद स0 01, 03, एवं 04 BOS से सम्बन्धित है शेष बिन्दु 02. श्री राजकमल सिंह असि० प्रोफे० पर्यावरण विज्ञान के शोध कार्य करने हेतु सम्बन्धित है लिखित उपार्जित अवकाश से सम्बन्धित है, श्री रमेश निर्धारित प्राध्यापक ... है। जिसकी आख्या प्रशासन शैक्षिक अनुभाग ... "X" अवकाश से सम्बन्धित
अतः बिन्दु स0 01, 03 एवं 04 माननीय कुलपति जी के अनुमोदनार्थ प्रस्तुत।

Hon'ble VC may approve item No. 1, 3 and 4 & the resolutions thereon, as recommended.
27/5/20

Clarification/comments for item No. 2 from Adm. is sought.
22.06.2020

SO Acad
27/5/2020

DR Acad
Pl. ask clarification on X from Adm. Section, separately
22.06.2020

DR (Acad)

Kindly clarify X above.
27/5/2020

Registrar

Date. 19.02.20

To

The Convener,
BOS Committee
HNB Garhwal University (A Central University)
Srinagar Garhwal

Subject: Application regarding my Ph.D. registration and allotment of Supervisor

Respected Sir,

This is to bring to your kind notice that I, Akash Deep. selected as PhD student in the department of Environmental Sciences on 18.11.2017. Till now I have not been allotted any Supervisor which makes my position miserable and pointless as far as my Ph.D. is concern so I would like to kindly request to the BOS Committee to allot me a guide from the department of Environmental Science only as been specifically mentioned in the university ordinance regarding supervisor for Ph.D. course.

Kindly consider my request.

Thanking you

Akash Deep
Research Scholar
Environmental Sciences

HEAD
Department of Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

December 23, 2019

To.
Dr. Vidhu Gupta
Assistant Professor
Department of Environmental Sciences
H.N.B Garhwal University
Srinagar Garhwal, Uttarakhand

Subject: Regarding my Ph.D. supervisorship

Respected mam.

This is bringing into your kind notice that I, **Akash Deep** Research scholar in the Department of Environmental Sciences, HNBGU got admitted (admission) for Ph.D. on November 18, 2017. I had successfully completed my six months Pre-Ph.D. course. Department conducted a Board of Studies (BOS) meeting on October 30, 2018 in which Prof. Ramesh C. Sharma, Department of Environmental Sciences had been appointed as my Ph.D. Supervisor who has retired on December 31, 2018. As per University norms, a retired Professor can't supervise a research scholar.

After this, current head of the Department (Mr. Rajkamal Singh) organized a BOS meeting on September 16, 2019 in which the BOS committee recommended Dr. Deepak Singh (Assistant professor, Department of Zoology, HNBGU) as my Research supervisor which is objected by the convener of the school board (Dean, School of Life Sciences) saying that how a faculty from other department can be my research supervisor .

Madam now I am willing to continue my research work under your supervision. I request you to kindly consider my request for the same.

I will be very grateful to you.

Thanking you.

Sincerely Your's

Akash Deep 23.12.19
Research scholar
Department of Environmental Sciences

Agreed to supervise as per University Norms.
23.12.19
(Dr. Vidhu Gupta)
Assistant Professor
Dept. of Environmental Sciences
HNBGU.

पाठ्यक्रम समिति की बैठक दिनांक-19.2.2020 एवं माननीया कुलपति जी की आख्या का अवलोकन करने की कृपा करें।

समिति द्वारा संस्तुत किये गये बिन्दु सं0-01,03,04 को अनुमोदन किया जाना है। बिन्दु सं0 02 पर श्री राजकमल सिंह, सहा0प्रो0 के अवकाश सम्बन्धी है जिसके लिए पृथक से यदि प्रशासन शैक्षिक को प्रेषित की गयी प्राप्त होने पर आवश्यक कार्यवाही सम्भव होगी।

पत्रावली में पुनः पाठ्यक्रम समिति द्वारा शोधार्थी आकाश दीप को शोध पर्यवेक्षक डॉ0 विधुशेखर बनाने की संस्तुति की है।

अतः माननीया कुलपति जी के अनुमोदनार्थ प्रस्तुत।

22/7/20

D R C (Head)

23/7/20

24.7.2020

Registrar

Hon'ble VC

28.7.2020

Annexure 2

To,

Date-19.02.20

The BOS Committee
Department of Environmental Sciences
HNB Garhwal University

Sub: Application for Pre-Ph.D. registration

Sir,

This is for your kind approval of my Pre-Ph.D. registration which had been prolonged procrastinated on the issue of leave not availed during the period of the Pre-Ph.D. course.

The reason for this simply was the dearth of teaching faculty in the department and if at all the reason is so profound then I would suggest adjusting the 6 months Pre-PhD leave. against my service leaves which account for 12 years of services

I hope that your amicable assistance to me would consider this.

Rajkamal Singh
HOD, Environmental Sciences

HEAD
Department of Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

Annexure 3

FIRST PROGRESS REPORT
NOVEMBER 2017- APRIL 2018

1. **Thesis Title: Study of heavy metal concentration found in road dust and its health risk assessment over Dehradun city, Garhwal Himalaya, India.**
2. **Name of Candidate: Ms. Lalita Bisht**
3. **Name of the Supervisor:** Dr. Vidhu Gupta, Assistant Professor, Environmental Sciences
4. **Registration Number :** LE- 17257
5. **Work Performed During Year:** November 2017 – April 2018
   a. Completed Pre-Ph.D. course work of six months according to Ph.D. Regulation 2009 of University Grants Commission.
   b. Collection of research papers and literature

6. **Conference, workshops and training programs attended**
   - National Training programme 'Aquifer mapping through participatory approach and local ground water issue' or held at H.N.B. Garhwal University, Srinagar, Pauri Garhwal, December 9, 2017.

Ms. Lalita Bisht
(Research Scholar)

7. **Forward and Comments on the Progress Report by the Supervisor**

Found Satisfactory and forwarded for approval to the BOS

Dr. Vidhu Gupta
(Supervisor)

Mr. Rajkamal Singh
HOD, Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

SECOND PROGRESS REPORT
MAY 2018 - OCTOBER 2018

1. **Thesis Title:** Study of heavy metal concentration found in road dust and its health risk assessment over Dehradun city, Garhwal Himalaya, India.
2. **Name of Candidate: Ms. Lalita Bisht**
3. **Name of the Supervisor:** Dr. Vidhu Gupta, Assistant Professor, Environmental Sciences
4. **Registration Number :** LE- 17257
5. **Work Performed During Year:** May 2018 – October 2018
   a. Preparation and submission of Synopsis
   b. Collected related research papers and literature
   c. Field visit for identification and selection of study area.
   d. Standardization of sampling methodology.
6. **Conference, workshops and training programs attended**
   - National Symposium on "Promotion of public awareness on water development, conservation and management in Uttarakhand" organised by Department of Environmental Sciences, H.N.B. Garhwal University (A Central University), Srinagar Garhwal, Uttarakhand.
   - Five day national workshop on "Research Methodology in Management and Social Sciences" organised by Department of Business Management, H.N.B. Garhwal University (A Central University), Srinagar Garhwal, Uttarakhand.

Ms. Lalita Bisht
(Research Scholar)

7. **Forward and Comments on the Progress Report by the Supervisor**

Found Satisfactory and forwarded for Approval to the BOS

Dr. Vidhu Gupta
(Supervisor)

Mr. Rajkamal Singh
HOD, Environmental Sciences
HEAD
Department of Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

THIRD PROGRESS REPORT
NOVEMBER 2018 - APRIL 2019

1. **Thesis Title:** Study of heavy metal concentration found in road dust and its health risk assessment over Dehradun city, Garhwal Himalaya, India.
2. **Name of Candidate:** Ms. Lalita Bisht
3. **Name of the Supervisor:** Dr. Vidhu Gupta, Assistant Professor, Environmental Sciences
4. **Registration Number :** LE- 17257
5. **Work Performed During Year:** November 2018 – April 2019
   a. Collection of relevant literature and research papers
   b. Collection of road dust samples (winter season) completed.
   c. Processing of dust samples (winter season) for the assessment of heavy metal analysis have been successfully completed.
   d. Calculation and statistical analysis of data

6. **Conference, workshops and training programs attended**
   - One day Training & Capacity Building Program on "Remote Sensing and Geographic Information System" organised by Uttarakhand Space Application Centre (USAC), held at H.N.B. Garhwal University, Srinagar, Pauri Garhwal.

Ms. Lalita Bisht
(Research Scholar)

7. **Forward and Comments on the Progress Report by the Supervisor**

Found Satisfactory
Forwarded for
Approval

Dr. Vidhu Gupta
(Supervisor)

Mr. Rajkamal Singh
HOD, Environmental Sciences

HEAD
Department of Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

FOURTH PROGRESS REPORT
MAY 2019- OCTOBER 2019

1. **Thesis Title:** Study of heavy metal concentration found in road dust and its health risk assessment over Dehradun city, Garhwal Himalaya, India.
2. **Name of Candidate:** Ms. Lalita Bisht
3. **Name of the Supervisor:** Dr. Vidhu Gupta, Assistant Professor, Environmental Sciences
4. **Registration Number :** LE- 17257
5. **Work Performed During Year:** May 2019 – October 2019
   a. Road dust sample collection from the study area (Summer season & Monsoon season) have been successfully completed.
   b. Processing of dust samples (Summer season and Monsoon season) for the assessment of heavy metal analysis have been successfully completed.
   c. Calculation and statistical analysis of data

Ms. Lalita Bisht
(Research Scholar)

6. **Forward and Comments on the Progress Report by the Supervisor**

Dr. Vidhu Gupta
(Supervisor)

Found satisfactory and forwarded for Approval

Mr. Rajkamal Singh
HOD, Environmental Sciences

Department of Environmental Sciences
H.N.B. Garhwal (Central) University
Srinagar Garhwal, Uttarakhand

Annexure 4

कार्यालय आदेश

विश्वविद्यालय अनुदान आयोग, नई दिल्ली के पत्र सं0 D.O.No.F.1-1/2018(Journal/CARE) दिसम्बर, 2019 की प्रति समस्त संकायाध्यक्ष/समस्त पाठ्यक्रम समिति (B.O.S) के संयोजको को इस आशय के साथ संलग्न कर प्रेषित की जा रही है कि पत्र में वर्णित निर्देशों के आधार पर आगामी पाठ्यक्रम समिति (B.O.S) की बैठक में उक्त पत्र के अनुसार अनुपालन सुनिश्चित करते हुए आगामी पी0एच0डी0 के शोधार्थियों के प्री पी0एच0डी0 कोर्स वर्क हेतु लागू करना सुनिश्चित करें।

आज्ञा से,
कुलपति

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय, श्रीनगर गढ़वाल

संदर्भ सं0 : शैक्षणिक/2020/49 दिनांक : 11 फरवरी, 2020

प्रतिलिपि निम्नलिखित के सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित :–

1. समस्त संकायाध्यक्ष/समस्त संयोजक--पाठ्यक्रम समिति , हे0न0ब0 गढ़वाल विश्वविद्यालय, श्रीनगर गढ़वाल।
2. परिसर निदेशक, बादशाहीथौल, टिहरी/पौडी/चौरास परिसर।
3. निदेशक–आई0क्यू0ए0सी0/एफ0डी0सी0।
4. पुस्तकालयाध्यक्ष, हे0न0ब0 गढ़वाल विश्वविद्यालय, श्रीनगर गढ़वाल।
5. संयुक्त कुलसचिव/समस्त उप कुलसचिव/सहायक कुलसचिव।
6. सिस्टम मैनेजर को इस आशय के साथ प्रेषित कि उक्त अधिसूचना को विश्वविद्यालय की वेबसाइट पर अपलोड करना सुनिश्चित करें।
7. निजी सचिव–कुलपति, माननीय कुलपति महोदया के सादर सूचनार्थ।
8. निजी सचिव–कुलसचिव।

डा0 (ए0के0 झा)
कुलसचिव

ज्ञान-विज्ञान विमुक्तये

प्रो. रजनीश जैन
सचिव
Prof. Rajnish Jain
Secretary

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(मानव संसाधन विकास मंत्रालय, भारत सरकार)
(Ministry of Human Resource Development, Govt. of India)
बहादुरशाह जफ़र मार्ग, नई दिल्ली-110002
Bahadur Shah Zafar Marg, New Delhi-110002
Ph.: 011-23236288/23239337
Fax : 011-2323 8858
E-mail : secy.ugc@nic.in

D.O.No.F.1-1/2018(Journal/CARE)

December, 2019

Respected Sir/Madam,

University Grants Commission in its 543rd meeting held on 9th August, 2019 approved two Credit Courses for awareness about publication ethics and publication misconducts entitled **"Research and Publication Ethics (RPE)"** to be made compulsory for all Ph.D. students for pre-registration course work (**attached as Annexure**).

In view of the above, you are requested to ensure that the above two Credit courses may be made compulsory for all Ph.D. students for pre-registration course work undertaken in your University from the forthcoming academic session.

With regards,

Yours sincerely,

(Rajnish Jain)

TO THE VICE-CHANCELLORS OF ALL UNIVERSITIES

ANNEXURE

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course

Course Code: CPE- RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

Syllabus in detail

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

- **RPE 02: SCIENTIFICCONDUCT (5hrs.)**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS (7 hrs.)**

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

1. Open access publications and initiatives

2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

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हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय श्रीनगर (गढ़वाल), उत्तराखण्ड– 246174
Hemvati Nandan Bahuguna Garhwal University, Srinagar (Garhwal), Uttarakhand– 246174

Telephone : 01346-250558-252143
Fax : 01346-250558

Ref : Acad/2020/ 376

Dated: 13-10-2020

सेवा में,

संयोजक / विभागाध्यक्ष
पाठ्यक्रम समिति, प्रर्यावरण विज्ञान विभाग
चौरास परिसर।

महोदय,

कृपया अपने पत्र दिनांक 01.10.2020 का सन्दर्भ ग्रहण करने का कष्ट करे, जिसमें आपके द्वारा विभागीय पाठ्यक्रम समिति प्रर्यावरण विज्ञान विभाग के गठन से सम्बन्धित अधिनियम के परिनियम 2(i), 2(ii)(3), 2(ii)(4), 2(ii)(5), 2(ii)(6) के अर्न्तगत पूर्व में कुलपति महोदय द्वारा नामित सदस्यों का कार्यकाल समाप्त होने के फलस्वरूप पुनः नये सदस्यों को नामित किये जाने का उल्लेख किया गया है।

कुलपति महोदया द्वारा पाठ्यक्रम समिति के गठन से सम्बन्धित अधिनियम 2(i), 2(ii)(3), 2(ii)(4), 2(ii)(5), 2(ii)(6) के परिनियम के अन्तर्गत निम्नलिखित सदस्यों को पाठ्यक्रम समिति प्रर्यावरण विज्ञान विभाग का सदस्य नामित किये जाने की सहर्ष स्वीकृति प्रदान की गई है।

परिनियम 2 (i)

1-Prof. R. K Maikhuri, Convener of BoS

परिनियम 2 (ii)(3) के अन्तर्गत एक वर्ष हेतु

1-Dr. Vidhu Gupta, Assistant Professor, DOES,

परिनियम 2 (ii)(4) के अन्तर्गत दो वर्ष हेतु

1-Prof Sunil Nautiyal, Centre for Ecological Economics and Natural Resources, Institute for Social and Economic Change, (ISEC, Mo Education, Govt. Of India), Bangalore 560072.

2-Dr.J.M.S. Tomar, Principal Scientist, Central Soil and Water Conservation Research and Training Institute,(CSWCRTI-ICAR), Dehradun

परिनियम 2 (ii)(5) के अन्तर्गत एक वर्ष हेतु

1-Dr. J.S. Chauhan, HOD, Himalayan Aquatic Biodiversity,Chauras Campus.

2-.Prof. R.C.Sundriyal, Deptt, of Forestry, Chauras Campus.

परिनियम 2 (ii)(6) के अन्तर्गत एक वर्ष हेतु

1- Dr. Yogendra Singh, RMP, PG College, Roorkee, Uttarakhand

अतः कृपया भविष्य में होने वाली पाठ्यक्रम समिति प्रर्यावरण विज्ञान विभाग की बैठक में उपर्युक्त अधिनियम के अन्तर्गत नामित सदस्यों को आमंत्रित करने का कष्ट करें।

भवदीय

13/10/20

उप कुलसचिव, शैक्षणिक

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय श्रीनगर (गढ़वाल), उत्तराखण्ड-- 246174
Hemvati Nandan Bahuguna Garhwal University, Srinagar (Garhwal), Uttarakhand– 246174

Telephone : 01346-250558-252143
Fax : 01346-250558

Ref : Acad/2021/78

Dated 9-2-2021

OFFICE ORDER

A Meeting of Board of Studies, Department of Environmental Science has been scheduled to be held on date 13-02-2021 in Chauras campus from 11:00 AM/PM. Onward.

All the hon'ble members are requested to attend to the meeting as per schedule.

This is issued on the recommendation of the convener, Board of Studies, Department of Environmental Science

As per order of Hon,ble vc in futuer only 3 BOS meeting be conducted in one year,

Registrar

Copy To:

1. Chairman BoS, Department of Environmental Science with a request to contact the members of Bos.
2. All members of the Board of Studies of Environmental Science
3. Dean, School of Life Sciences
4. P.A. to Finance officer.

Section officer
Academic & Research

Department of Environmental Sciences

H.N.B. Garhwal University (A Central University)
Srinagar (Garhwal) -246174, Uttarakhand

13 February, 2021

Minutes of the of the14th Board of Studies (BOS) Meetingof Environmental Sciences

The meeting of the Board of Studies (BOS) in Environmental Sciences was held on **13 February, 2021 via online mode** at the Department of Environmental Sciences, HNB Garhwal University, Chauras Campus.
The meeting started with the opening remarks of the Chairperson extending the warm welcome to all members and expressed his thankfulness for sparing their valuable time for meeting.

The following members were present:

1. Prof R.K Maikhuri, HOD, Environmental Science, Convenor
2. Prof. R. C. Sundriyal, Forestry and Natural Resources
3. Prof. Sunil Nautiyal, Centre for Ecological Economics and Natural Resources, ISEC,Bangalore
4. Dr. Jagmohan Tomar, Centre Soil and Water Conservation Research and Training Institute, Dehradun
5. Dr. Jas pal Singh Chauhan, HOD, Department of Himalayan Aquatic Biodiversity
6. Dr. Vidhu Gupta, Assistant Professor, Environmental Sciences

The various agenda items were discussed and resolved. The BOS took the following decisions unanimously as under:

Item No. 1. Approval of the minutes of the last meeting of BOS held on 19.02.2020.

Resolution: The BOS committee gave its approval for the Approval of the minutes of the last meeting of BOS held on 19.02.2020.

Item No. 2. To Consider the Progress Reports of Ms. Lalita Bisht, Research Scholar (Reg. No. LE- 17257)

Resolution: The BOS approves the following progress reports of Ms. Lalita Bisht (Annexure 3)

(i) Progress Report (Nov 2019-April 2020)
(ii) Progress Report (May 2019-Oct 2020)

Item No. 3. To Consider the Progress Reports of Mr Akash Deep, Research Scholar (Reg. No. LE- 17260)

Resolution: The BOS approves the following progress reports of Mr Akash Deep (Annexure 3)

(i) Progress Report (Nov 2017-April 2018)
(ii) Progress Report (May 2018-Oct 2018)
(iii) Progress Report (Nov 2018-April 2019)
(iv) Progress Report (May 2019-Oct 2019)
(v) Progress Report (Nov 2019-April 2020)
(vi) Progress Report (May 2019-Oct 2020)

Item No. 4. To consider the application regarding establishment of Journal Club in department of Environmental Sciences.

Resolution: The BOS committee gave its approval to establish the **Journal Club** in the Department and also approved the following member name for this committee
1. Prof R.K Maikhuri, HOD, Dept. of Environmental Science, HNBGU
2. Dr. Vidhu Gupta, Assistant Professor, Dept. of Environmental Science, HNBGU.

Item No. 5. To consider the application for revision and modification of Pre-Ph.D. syllabus as per University letter no.Sekshnik/2020/4911, dated 11-2-2020.

Resolution: BOS gave its approval for revision and modification of Pre-PhD syllabus as per University letter no.Sekshnik /2020/4911, dated 11-2-2020and also gave its approval for including this paper in ongoing Pre-Ph.D. course work for session 2021-22.

Item No. 6. To consider the application for revision and modification of M.Sc. Environmental Sciences syllabus.

Resolution: Approved.

Item No. 7. Constitution of Departmental Academic Integrity Penal (DAIP) committee in the Department.

Resolution: BOS Committee gave its approval for the constitution of the DIAP committee in the department and also approved the following member name for this committee.
1. Prof R.K Maikhuri, HOD, Dept. of Environmental Science, HNBGU
2. Dr. Vidhu Gupta, Assistant Professor, Dept. of Environmental Science, HNBGU
3. Prof. R. C. Sundriyal, Forestry and Natural Resources, HNBGU

Item No. 8. To consider the application for development of Memorandum of Understanding (MOU) between CSIR – National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur and Centre for Ecological Economics an Natural Institute Resources, Institute for Social and Economic Change, (ISEC, Mo Education, Govt. of India), Bangalore.

Resolution: Approved.

FTS No: 28644
Date: 29/03/2022

Department of Environmental Sciences
H.N.B. Garhwal University (A Central University)
Srinagar (Garhwal) -246174, Uttarakhand

Date: 28 February 2022

Minutes of the Meeting of the Board of Studies (BOS) in Environmental Sciences

The meeting of the Board of Studies (BOS) in Environmental Sciences was held on **28 February, 2021** via online modeat the Department of Environmental Sciences, HNB Garhwal University, Chauras Campus.

The Convenor welcomed all the members of BOS in the meeting.

The following members were present in the meeting

1. Prof R.K. Maikhuri, HOD Dept. of Environmental Sciences, HNB Garhwal University, Srinagar, Garhwal(Convenor)
2. Prof. R.C. Sundriyal, Dept of Forestry and Natural Resources, HNB Garhwal University, Srinagar, Garhwal
3. Prof. Sunil Nautiyal, Head, Centre for Ecological Economics and Natural Resources, ISEC, Bangalore, Karnataka
4. Dr. Jagmohan Singh Tomar, Principal Scientist, Centre Soil and Water Conservation Research and Training Institute, Dehradun, Uttarakhand
5. Dr. Jaspal Singh Chauhan, HOD, Himalayan Aquatic Biodiversity, HNB Garhwal University, Srinagar, Garhwal
6. Dr. Jogendra Singh, Head &Assistant Professor, Dept. of Agricultural Chemistry, RMP, PG College, Roorkee, Uttarakhand
7. Dr. Vidhu Gupta, Assistant Professor, Dept. of Environmental Sciences, HNB Garhwal University, Srinagar, Garhwal

The BOS took the following decisions unanimously.

Item No. 1. Approval of the minutes of the last meeting of BOS held on 13.02.2021.
Resolution: The board approved the item no 1.

Item No. 2. To consider the Minutes of the previous BOS (13.02.2021) in the meeting of school board of Life Sciences, HNB Garhwal University, Srinagar, Garhwal
Resolution: The boardapproved the item no 2.

Item No. 3. To consider the 7th and 8th Progress Reports of Ms. Lalita Bisht, Research Scholar **(Reg. No. LE- 17257)**
Resolution: The BOS approved the progress reports of Ms. Lalita Bisht (Annexure [1] attached).

Item No. 4. To consider the 7th and 8th Progress Reports of Mr. Akash Deep, Research Scholar **(Reg. No. LE- 17260)**

Resolution: The BOS approved the progress reports of Mr. Akash Deep (Annexure [2] attached).

Item No. 5. To consider the Ph.D. synopsis and progress report of Mr. Ashok Kumar Meena, (Presentation of synopsis for the registration in the Ph.D.programme in Environmental Sciences)

Resolution: The BOS approved the of Ph.D. synopsis and progress report of Mr. Ashok Kumar Meena (Annexure [3] attached).

Item No. 6. To consider the revised and modifiedPre Ph.D.syllabus.

Resolution: The BOS committee approved therevisedPre Ph.D. syllabus (Annexure [4] attached).

Item No. 7. To consider the revised and modified syllabus of M.Sc. Environmental Sciences and PG Diploma in Environmental management.

Resolution: The BOS committee approved the revised syllabus of M.Sc. Environmental Sciences and PG Diploma in Environmental management (Annexure [5] attached).

Item No. 8. To consider the enhancement of seats in the course of M.Sc. Environmental Sciencesfrom 22 to 35 in both regular and sponsored categories. (under regular category from 17 to 25 seats and under sponsored category from 5 to 10).

Resolution: The BOS committee gave their approval for the same and suggest to put the matter in to the school board of life sciences (Annexure [6] Attached).

Item No. 9. To consider the request for the recruitment of new faculty members in the Dept. of Environmental Sciences, HNB Garhwal University, Srinagar, Garhwal.

Resolution: The BOS committees gave their approval for the same and suggest to put the matter in to theschool board of Life Sciences. (Annexure [7] attached)

Item No. 10. To consider the request for utilizing the funds(for developingminor facilities and meeting other necessary requirements) generated by the Dept. of Environmental Sciences from sponsored seats as per the university norms.

Resolution: The board approved this matter and suggested to put the matter in School board of Life Sciences.

Item No. 11. To consider the application for constitution of Plagiarism Committee and Library Committee of Dept. of Environmental Sciences.

Resolution: The Board Approved the constituted committee(Annexure [8] Attached).

FTS No: 28644
Date: 29/03/2022

Department of Environmental Sciences
H.N.B. Garhwal University (A Central University)
Srinagar (Garhwal) -246174, Uttarakhand

Date: 28 February 2022

Minutes of the Meeting of the Board of Studies (BOS) in Environmental Sciences

The meeting of the Board of Studies (BOS) in Environmental Sciences was held on **28 February, 2021** via online modeat the Department of Environmental Sciences, HNB Garhwal University, Chauras Campus.

The Convenor welcomed all the members of BOS in the meeting.

The following members were present in the meeting

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2. Prof. R.C. Sundriyal, Dept of Forestry and Natural Resources, HNB Garhwal University, Srinagar, Garhwal
3. Prof. Sunil Nautiyal, Head, Centre for Ecological Economics and Natural Resources, ISEC, Bangalore, Karnataka
4. Dr. Jagmohan Singh Tomar, Principal Scientist, Centre Soil and Water Conservation Research and Training Institute, Dehradun, Uttarakhand
5. Dr. Jaspal Singh Chauhan, HOD, Himalayan Aquatic Biodiversity, HNB Garhwal University, Srinagar, Garhwal
6. Dr. Jogendra Singh, Head &Assistant Professor, Dept. of Agricultural Chemistry, RMP, PG College, Roorkee, Uttarakhand
7. Dr. Vidhu Gupta, Assistant Professor, Dept. of Environmental Sciences, HNB Garhwal University, Srinagar, Garhwal

The BOS took the following decisions unanimously.

Item No. 1. Approval of the minutes of the last meeting of BOS held on 13.02.2021.
Resolution: The board approved the item no 1.

Item No. 2. To consider the Minutes of the previous BOS (13.02.2021) in the meeting of school board of Life Sciences, HNB Garhwal University, Srinagar, Garhwal
Resolution: The boardapproved the item no 2.

Item No. 3. To consider the 7th and 8th Progress Reports of Ms. Lalita Bisht, Research Scholar **(Reg. No. LE- 17257)**
Resolution: The BOS approved the progress reports of Ms. Lalita Bisht (Annexure [1] attached).

Item No. 4. To consider the 7th and 8th Progress Reports of Mr. Akash Deep, Research Scholar **(Reg. No. LE- 17260)**

Resolution: The BOS approved the progress reports of Mr. Akash Deep (Annexure [2] attached).

Item No. 5. To consider the Ph.D. synopsis and progress report of Mr. Ashok Kumar Meena, (Presentation of synopsis for the registration in the Ph.D programme in Environmental Sciences)

Resolution: The BOS approved the of Ph.D. synopsis and progress report of Mr. Ashok Kumar Meena (Annexure [3] attached).

Item No. 6. To consider the revised and modifiedPre Ph.D.syllabus.

Resolution: The BOS committee approved therevisedPre Ph.D. syllabus (Annexure [4] attached).

Item No. 7. To consider the revised and modified syllabus of M.Sc. Environmental Sciences and PG Diploma in Environmental management.

Resolution: The BOS committee approved the revised syllabus of M.Sc. Environmental Sciences and PG Diploma in Environmental management (Annexure [5] attached).

Item No. 8. To consider the enhancement of seats in the course of M.Sc. Environmental Sciencesfrom 22 to 35 in both regular and sponsored categories. (under regular category from 17 to 25 seats and under sponsored category from 5 to 10).

Resolution: The BOS committee gave their approval for the same and suggest to put the matter in to the school board of life sciences (Annexure [6] Attached).

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Item No. 11. To consider the application for constitution of Plagiarism Committee and Library Committee of Dept. of Environmental Sciences.

Resolution: The Board Approved the constituted committee(Annexure [8] Attached).

Item No. 12. To approve the Panel of Experts/ Examiners for evaluation of the Ph.D. thesis in Environmental Sciences.

Resolution: The Board Approved the panel of Experts / Examiners for evaluation of the Ph.D. thesis in Environmental Sciences (Annexure [9] attached).

Item No. 13. Any other points/issues with the permission of chair.

The board forwarded the minutes of present BOS (28.02.2022) in to the school board of Life Sciences.

Prof. R. C. Sundriyal
Member

Prof. Sunil Nautiyal
External Expert, Member

Dr. Jagmohan Tomar
External Expert Member

Dr. Jogendra Singh
External Expert Member

Dr. Jashpal Singh Chauhan
Member

Dr. Vidhu Gupta
Member

Prof. R. K. Maikhuri
Convenor
HOD, Environmental Sciences

Forwarded for School Board

PROF. A.K. DOBRIYAL
Dean, School of Life Sciences
H.N.B. GARHWAL UNIVERSITY
SRINAGAR GARHWAL - 246174

B.O.S. रजिस्टर दि० 19.4.2022 को Academic Section में प्राप्त किया गया है।

19.4.2022

19/4/2022

Item No. 12. To approve the Panel of Experts/ Examiners for evaluation of the Ph.D. thesis in Environmental Sciences.

Resolution: The Board Approved the panel of Experts / Examiners for evaluation of the Ph.D. thesis in Environmental Sciences (Annexure [9] attached).

Item No. 13. Any other points/issues with the permission of chair.

The board forwarded the minutes of present BOS (28.02.2022) in to the school board of Life Sciences.

Prof. R. C. Sundriyal
Member

Prof. Sunil Nautiyal
External Expert, Member

Dr. Jagmohan Tomar
External Expert Member

Dr. Jogendra Singh
External Expert Member

Dr. Jashpal Singh Chauhan
Member

Dr. Vidhu Gupta
Member

Prof. R. K. Maikhuri
Convenor
HOD, Environmental Sciences

Forwarded for School Board

PROF. A.K. DOBRIYAL
Dean, School of Life Sciences
H.N.B. GARHWAL UNIVERSITY
SRINAGAR GARHWAL - 246174

B.O.S. रजिस्टर दि० 19-4-2022 को Academic Section में प्राप्त किया गया है।

19-4-2022

19/4/2022

पाठ्यक्रम समिति [illegible] विज्ञान की बैठक दि० 28-2-2022 में सभी मद B.O.S. से संस्तुत हैं। मद सं० 06, 07, 08, 09 व 10 को स्कूल बोर्ड में रखा जाना है तथा शेष मद कुलपति महोदया के अनुमोदनार्थ प्रस्तुत

19-4-2022

SO

19/4/2022

AR

DR(A)

19/4/22

Registrar

pvc

19/04/2022

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय
Hemvati Nandan Bahuguna Garhwal University
श्रीनगर गढवाल (उत्तराखण्ड)–246174
Srinagar (Garhwal), Uttarakhand– 246174
(केन्द्रीय विश्वविद्यालय)
(A Central University)
E-mail:Registrar.hnbgu@gmail.com
Website:www.hnbgu.ac.in

Ref: Acad/2022/933

Date 30-3-

OFFICE ORDER

A meeting of Board of Studies, Department of Environmental Science has been scheduled to be held on date 5-4-2022 in Chauras campus from 11.00 AM/PM onward.

All the Hon'ble members are requested to attend to the meeting as per schedule.

This is issued on the recommendation of the convener, Board of Studies, Department of Environmental Science is mandatory to have one external extert in the BOS meeting.

As per order of Hon,ble V.C in future only 3 BOS Meeing be conducted in one year,

Registrar

Copy to:

1. Chairman BoS, Department of Environmental Sciences with a request to inffimate the members of BoS member at Department level also.
2. All members of the Board of Studies of Department of Environmental Sciences
3. Dean School of Life Sciences
4. Finance officer.

Section officer, Acadimic

Date : ..../...../.....

DEPARTMENT OF HIMALAYAN AQUATIC BIODIVERSITY, HNB GARHWAL UNIVERSITY, SRINAGAR

MINUTES OF PROCEEDINGS OF THE FIRST BOARD OF STUDIES IN HIMALAYAN AQUATIC BIODIVERSITY

A meeting of the members of the Board of Studies in Himalayan Aquatic Biodiversity was held today on 13-04- 2018 in the Dean Life Science office, Birla, Srinagar. Following members attended the meeting:

1. **Prof. N.S. Bisht**, Dean, School of Life Sciences, Convener
2. **Prof. Y.S. Farswan,** Dept. of History, Culture and Archaeology, Member
3. **Dr. R.K. Maikhuri,** GB Pant National Institute of Himalayan Environment & Sustainable development, member
4. **Dr. Jaspal Singh Chauhan,** department of Himalayan Aquatic Biodiversity, member

Dr. Jaspal Singh Chauhan welcomed the members and placed the agenda for the discussion. Following decisions have been taken unanimously:

1. **To approve the revised syllabus of M.Sc. 'Himalayan Aquatic Biodiversity'**

   Submitted for discussion and further approval.

   Resolution: The revised M.Sc. syllabus was approved with minor modifications by the members.

2. **Requirement of building for Himalayan Aquatic Biodiversity department.**

   Submitted for consideration

   Resolution: The members accord their consent for building requirement of Himalayan Aquatic Biodiversity department. Dr J S Chauhan is advised to submit the requirement of Laboratory, Classrooms, Faculty rooms, seminar hall, office room and furniture to the engineering section of University. Also he will send a proposal to the University for Equipment and consumables

3. **Requirement of Staff for Himalayan Aquatic Biodiversity department.**

   Submitted for consideration

   Resolution: The members accord their consent for Staff requirement in Himalayan Aquatic Biodiversity department and Dr J S Chauhan is asked to send a letter to Honorable VC/Registrar for teaching and Non teaching staff.

DEPARTMENT OF HIMALAYAN AQUATIC BIODIVERSITY, HNB GARHWAL UNIVERSITY, SRINAGAR

MINUTES OF PROCEEDINGS OF THE 4th BOARD OF STUDIES IN HIMALAYAN AQUATIC BIODIVERSITY

A meeting of the members of the Board of Studies in Himalayan Aquatic Biodiversity was held today on 27-02- 2020 in the department of Himalayan Aquatic Biodiversity, Chauras. Following members attended the meeting:

1. **Prof. R.P. Bhatt**, Dean, School of Life Sciences, Convener
2. **Dr. R.S. Negi,** Head, Dept. of Rural Technology, Member
3. **Dr. R.K. Maikhuri,** GB Pant National Institute of Himalayan Environment & Sustainable development, member
4. **Dr. Deepak Bhandari,** Dept. of Zoology and Biotechnology, Member
5. **Dr. Jaspal Singh Chauhan,** department of Himalayan Aquatic Biodiversity, member

Chairperson BOS welcomed the members and placed the agenda for the discussion. Following decisions have been taken unanimously:

1. Approval of the minutes of 3rd BOS meeting

The minutes of the 3rd BOS meeting held on 25-05-2019 was circulated among the BOS members. Since no comment has been received, this BOS has approved the minutes of 3rd BOS meeting

Resolution: The BOS has approved the minutes of the 3rd BOS meeting.

2. **To add the new paper "Research and Publication Ethics in Ph.D. programme of Himalayan Aquatic Biodiversity and update the course structure.**

Submitted for discussion and further approval.

Resolution: As per the UGC guidelines a new paper "Research and Publication Ethics (2 credit)' was given approval to be added in the Pre-Ph.D. programme. Further, paper titled 'Review of literature and presentation of a seminar on a research theme related topic' (3 credit) was changed as 'Review of literature' (1 credit) with the consent of members.

3. **To consider Dr. Jaspal Singh Chauhan as a regular Head of Department of Himalayan Aquatic Biodiversity.**

Submitted for consideration and further discussion

Resolution: The case of Dr. Jaspal Singh Chauhan was discussed and the members accord their consent for considering him as a regular Head of Department.

4. **To approve Dr. Jaspal Singh Chauhan as a Ph.D. supervisor of Kumari Neha**

Submitted for discussion and further approval.

Resolution: The members approved Dr Jaspal Singh Chauhan as the Ph.D. supervisor of Kumari Neha

5. **To constitute departmental Academic Integrity Panel (DAIP) for plagiarism control.**

As per university order no. Acad/2020/57 in reference to UGC letter no. D.O.No. F.1-18/2010 (CPP-II) dated 06 Aug, 2018 the departmental academic integrity panel committee is proposed to be constituted for plagiarism checking as follows

1) Chair person: Dean School of Life Sciences

BOARD OF STUDIES

DEPARTMENT OF HIMALAYAN AQUATIC BIODIVERSITY

HEMVATI NANDAN BAHUGUNA GARHWAL UNIVERSITY, SRINAGAR

Meeting: 5th Meeting — Dated: 26 February, 2021

Venue: Through video Conferencing — Time: 11:00 am

Ref: office order No2021/08 dated 16/02/21

In accordance with the relevant provisions of the Ordinances, the 5th Meeting of the Board of Studies (Department of Himalayan Aquatic Biodiversity) is held as per schedule.

Following members participated:

1. Dean, School of Life Sciences ----------Chairperson
2. Dr. Jaspal Singh Chauhan----------Member
3. Prof. Yuvraj Singh Negi----------External member
4. Dr. Soban Singh Rawat----------External Member
5. Prof. PC Lakhera..... Cognate Members
6. Prof. R.K. Maikhuri..... Cognate Members

The meeting commenced with opening remarks of Chairperson. He wholeheartedly welcomed all participating members and appreciated their online availability despite their busy schedule elsewhere. It was hoped of valuable contribution of all esteemed members for the success of the meeting. The valuable contributions made by outgoing chairpersons and members (Prof. J.P. Bhatt, Prof. R.P. Bhatt, Dr. R.S. Negi and Dr. Deepak Bhandari) whose tenure came to an end at different time, are sincerely recorded and appreciated.

Various items listed on agenda were taken up for deliberations.

Agenda item No. 1. To confirm the minutes of previous Board of Studies (4th BOS) meeting held on 27-02- 2020

The minutes of the 4th BOS meeting held on 27-02- 2020 were circulated among the BOS members for their comments and finalized afterwards.

Action taken Report-The proceeding was submitted to Joint Registrar (Academic) by the Chairperson through Dean, SLS for further action by the concerned section of the university.

Resolution: Approved

Agenda item No. 2. Establishment of Journal Club as per Director, Internal Quality Assessment Cell (IQAC) email dt. 01.12.2020.

In compliance with directive email received from Director, IQAC on date 01/12/2020 the constitution of the Journal Club is proposed as under (**Annexure2**).

Director of Journal Club: Head of the Department

Members – All Research Supervisors (at present there is only one regular faculty/research supervisor functioning in the department, therefore, all research scholars are proposed to be co-opted as members).

be invited for discussion in the interest of overall growth of the department as well as the journal club more informative and meaningful.

Resolution: Approved as proposed.

Agenda item No. 3. Revision of syllabus in M.Sc. Himalayan Aquatic Biodiversity IVth semester. (Annexure 3)

(In view of the availability of the single faculty and occasionally guest faculty, it is not possible to justify the dissertation to be offered to all students in the fourth semester, and to get the quality work done as the purpose of dissertation. Few changes in the syllabus are proposed).

It is envisaged that there will be two sets of the students:

3.1. It is proposed to offer the dissertation to selective 3-4 students depending upon their willingness. For such students the present scheme of dissertation will continue which already exist in the syllabus content.

And/or

3.2. If no student is willing to work for dissertation, all students in the Fourth semesters will be offered two Elective Courses. For these, the following changes are proposed

- The line "**the dissertation is a semester long elective course of 06 credits and is mandatory for every student**" in the M.Sc. Fourth Semester (Himalayan Aquatic Biodiversity) syllabus be read as "***in fourth semester two theory Elective Courses out of 03 Credits (out of following three proposed elective courses) each will be offered to every student in lieu of dissertation of 06 Credits***". The titles and syllabi of the proposed theory elective courses are as under (**Annexure 3.A**)

  1) Freshwater Aquaculture

  2) Aquaculture Biotechnology

  3) Himalayan rivers: Status, Destruction and Management

The detailed theory course structures of these optional elective courses are enclosed in **Annexure 3.A**

The scheme will be effective from batch 2018-19

Resolution: Approved (The In-Charge HOD is directed to rationally streamline the contents of the syllabi in consultation with Dr. Deepak Bhandari and Dr. Pooja Saklani). The structure/contents of new syllabi and examination scheme will suitably be modified accordingly.

Agenda item No. 4. Compliance of office order No. 16/2021 (Meeting of the academic council held on 10-10-2020). (Annexure 4)

It was directed to prepare the panel of names/address of 30 experts (approve through BOS/ School Board) to be submitted to the Hon'ble Vice Chancellor for one year for the purpose evaluation of Ph.D. thesis.

However, in the department of Himalayan Aquatic Biodiversity, one scholar is pursing Ph.D. since 2019 and another scholar joined in August 2020. There will not be any need of such panel of examiners for Ph.D. thesis evaluation for coming two years at least. Therefore, such panel will be prepared/ processed well in time almost 6 months before the likely submission of Ph.D. thesis of the scholar.

Resolution: Noted

3380
17-4-15

HNB Garhwal University (A Central University)
Srinagar Garhwal, 246174, Uttarakhand
Department of Zoology & Biotechnology

Ref: HNBGU/Zoobiotech//2015

10 April, 2015

To

Kind Attn: Dy. Reg. (Acad.)

The Dean
School of Life Science
HNB Garhwal University
Srinagr Garhwal

Subject: Proceedings of the 4th Meeting of BOS **(Zoology)** (dated 28.03.2015)

R/Sir,

The Proceedings of 4th Meeting of BOS **(Zoology)** are enclosed herewith for your kind perusal and consideration.

Most respectfully, it is requested to kindly forward it for approval of the Competent Authority (Hon'ble Vice-Chancellor Sir).

Thanking you.

Faithfully yours

10.4.2015

Head &
Chairperson
BOS (Zoology)

Dept. of Zoology & Biotechnology
H.N.B. Garhwal University
(A Central University)
Pauri Garhwal

Encl: a a

Forwarded

DEAN
School of Life Sciences
H.N.B. Garhwal University
(A Central University)
Srinagar (Garhwal) Uttarakhand - 246174

PROCEEDINGS

Department of Zoology & Biotechnology

Board of Studies (Zoology)

Fourth Meeting **March, 28, 2015**

Venue: Department Conference Room **Time: 10.00 AM**

In accordance with the relevant provisions of the Ordinances, the Registrar issued the Notification (Ref. Academic/2015/894 dated 13/3/2015).

The Meeting was held and following members participated:

1. Professor AK Dobriyal
2. Professor JP Bhatt
3. Professor N. Singh
4. Professor SN Bahuguna
5. Professor P. Nautiyal
6. Professor MS Bisht
7. Professor NK Agarwal
8. Professor RS Bisht
9. Professor PC Joshi
10. Professor NS Panwar
11. Professor RC Dimri
12. Dr. DK Sharma
13. Dr. CB Kotnala

Contd.

The Chair welcomed all hon'ble members for sparing their valuable time and participating in the meeting. As circulated earlier, the agenda items were discussed and following recommendations were made:

Item nos:

4.01 The meeting records appreciation to the contribution made by Prof N Singh as Chairperson during his tenure. The services of outgoing members (Prof A R Nautiyal, Prof S S Rawat and Dr R S Fartyal) is highly appreciated and nomination of new members (Prof N S Panwar, Prof R C Dimri and Dr C B Kotnala) is welcomed.

4.02 Minutes of the 3rd meeting of BOS (Zoology) dated 24/11/2014 are placed for confirmation (Annexure 4.02).

Action Taken Report: The proceedings were submitted to DR (Academic) by the Chairperson through Dean SLS for its approval in Academic council (Agenda item No 13). It was approved by the Academic council held on 31.01.2015

Resolution: Approved

4.03 **Syllabi:** The syllabus for B Sc Zoology is redesigned as per new CBCS system and is tabled in the meeting.

The efforts made by committee members (Prof P Nautiyal, Prof. O. P. Gusain, Prof. M. S. Bisht, Dr. C. B. Kotnala, Prof .N. K. Agrawal, Dr. D. K. Sharma, Dr. P. C. Lakhera, Dr. P. Saklani, Dr Saurabh Yadav and Dr Indrashish Bhattacharya) is appreciated.

It is also proposed to double the quantum of grant to the Department in view of double expenditure to conduct the Lab course examinations in each semester, i.e., 6 Lab course examinations will be conducted in future in place of 3 at present. Also the grant should be made available to the department in the beginning of the session.

Resolution: Course structure and contents approved. Chairperson is authorized to make any alteration, if required.

4.04 **(a)** 1st to 4th Yearly Progress reports submitted by Ph D Scholars (Batch 2011) and work proposed to be done in the ensuing academic year

Following students submitted their Yearly Progress Report (1st to 4th) as per provision down in the ordinance.

(i) Priyanka
(ii) Manisha Sarshwat
(iii) Surveer Singh
(iv) Anand Kumar
(v) Hemlata Pokhriyal
(vi) Pradeep Sati
(vii) Gurnam Singh

Resolution: Approved as forwarded by the supervisors

4.04 (b) Extension sought by Ph D Scholars to submit their thesis, after completion of 4 years.

Following students submitted application for 1 year extension to submit their Ph D thesis.

(i) Priyanka
(ii) Manisha Sarshwat
(iii) Surveer Singh
(iv) Anand Kumar
(v) Hemlata Pokhriyal
(vi) Pradeep Sati
(vii) Gurnam Singh

Resolution: Approved as per the provision in the ordinance (Section 11A)

4.05 2nd Yearly Progress reports submitted by Ph D Scholars (Batch 2013) and work proposed to be done in the ensuing academic year

(i) Gaurav Bhatt
(ii) Pranav Singh
(iii) Mohd Rashid
(iv) Neeraj K Sharma
(v) Rachna
(vi) Gunjan Goswami
(vii) Bijendra Kumar

(iii) Koshal kumar
(ix) Amir basher
(x) Rajbeer Singh
(xi) Ashok K Chowdhary
(xii) Upendra Singh
(xiii) Ritwik Mondal

Resolution: Approved as forwarded by the supervisors

4.06. (a) Consideration of Synopsis resubmitted by scholars for approval (Earlier agenda item No 2.08 and 3.12)

(i) Pooja Chauhan: Candidate submitted revised synopsis on the topic, **" Population dynamics of Tomato Fruit Borer, *Helicoverpa armigera* (Hub.) and efficacy of selected bio-pesticides in Western Doon valley".**

Resolution: The experts examined the revised synopsis and resolved that- After incorporation of minor modifications as suggested, the Chairperson is authorized to approve the synopsis.

(ii) Mukesh lal Shah: Candidate submitted revised synopsis on the topic, **" Biodiversity and ecology of white grub in agriculture and forest areas of Doon valley, Uttarakhand".**

Resolution: The experts examined the revised synopsis and resolved that- After incorporation of minor modifications as suggested, the Chairperson is authorized to approve the synopsis.

(iii) Shepali Chalotra: Candidate submitted revised synopsis on the topic, **"Current ecological status of Lower stretch of Song river from Doon Valley, Uttarakhand"**

Resolution: The experts examined the revised synopsis and resolved that- Title of the synopsis be revised as, **"ECOLOGICAL STATUS OF LOWER STRETCH OF SONG RIVER, DOON VALLEY, UTTARAKHAND"**

Synopsis with revised title approved.

Pooja Chauhan, Mukesh Lal and Shepali Chalotra submitted their 1st and 2nd Yearly reports.

ution: Approved as forwarded by the supervisors

7. Presentation of Synopsis for Ph D Registration of 2013 Batch

. Mohd Sagir

Title: Effect of Riparian Vegetation on Periphytic Communities of River Western Nayar

Name of Supervisor Prof. A.K. Dobriyal, HNBGU Campus, Pauri

Resolution: Synopsis approved with revised title (Effect of Vegetation on Benthic Communities of River Western Nayar**).**

2. Sudesh Kumar

Title: A Study on Avian Ecology of Temperate Forests of Garhwal Himalaya (Western Himalaya) Uttrakhand

Name of Supervisor Prof. M.S. Bisht, HNBGU Campus, Pauri

Resolution: Synopsis approved

3. Gulzar Ahmad Bhat

Title: "Freshwater Bio-monitoring with Macroinvertebrate in selected water bodies in some hill district with diverse climatic conditions".

Name of Supervisor Dr. R.K. Jauhari, DAV Dehradun

Resolution:

(i) Revised title "Bio-monitoring of selected Himalayan water bodies with reference to macro-invertebrates" is approved.

(ii) Dr M A Paray (SKUAST- K Shalimar) is approved as his co-supervisor.

(iii) Experts have made certain suggestions in synopsis. Revised synopsis should be presented in next BOS

4. Sumit Kumar

Title: Analysis of Phenotypic and Genotypic Variability within Species of Genus *Barilius* from Different Tributaries of Alaknanda and Chenab Rivers

Name of Supervisor Dr. Deepak Singh , HNBGU Srinagar Garhwal

Resolution: Synopsis approved

Naveed Chowdhary

Title: "Photo Toxicological Studies on Selected Hill Stream Fishes with Retene Photosensitizer"

Name of Supervisor Dr. Sunil Kumar, DAV College Dehradun

Resolution: Title of synopsis approved.

Minor changes are suggested in Aims and objectives. Chairperson is authorized to approve synopsis after incorporating the changes.

6. **Km. Asha**

Title: Taxonomic Study of Drosophilids from Some Regions of Himachal Pradesh and Uttarakhand with Molecular Characterization of some Species.

Name of Supervisor Dr. R.S. Fartyal HNBGU Srinagar Garhwal

Resolution: Synopsis approved with revised title (Taxonomic Study of Drosophilids from adjoining areas of Himachal Pradesh and Uttarakhand with Molecular Characterization of some Species).

7. **Alauddin:** Requested to allow presentation of Synopsis in next BOS

Name of Supervisor: Prof. N.K. Agarwal HNBGU Campus Badshahi Thaul, Tehri

Resolution: Allowed.

4.08: Allocation of additional grant to the Department proportionately to the number of Ph D scholars working as well as to run the pre Ph D course(s)

Resolution: Approved.

4.09: It is proposed to start new elective course " Freshwater Biodiversity" at PG level.

Resolution: Recommended.

Prof. P. Nautiyal and Prof. O. P. Gusain are requested to work out the details of the Course.

4.10 Other Items: Chairperson thanked all members present for their contribution.

Vote of thanks: The meeting concluded with the vote of thanks to the chair.

28/3/2015

Chairperson / HoD, BOS Zoology Course

Copy to:
All concerned Hon'ble members

(Professor JP Bhatt)

(Professor N. Singh)

(Professor SN Bahuguna)

(Professor P. Nautiyal)

(Professor MS Bisht)

(Professor NK Agarwal)

(Professor RS Bisht)

(Professor PC Joshi)

(Professor NS Panwar)

(Professor RC Dimri)

(Dr. DK Sharma)

(Dr. CB Kotnala)

(Prof. AK Dobriyal)

For Worded

DEAN
School of Life Sciences
H.N.B. Garhwal University
(A Central University)
Srinagar (Garhwal) Uttarakhand - 246174

नन्दन बहुगुणा गढ़वाल विश्वविद्यालय, श्रीनगर (गढ़वाल) – 246174
(केन्द्रीय विश्वविद्यालय)
emwati Nandan Bahuguna Garhwal University, Srinagar (Garhwal) – 246174
(A Central University)
दूरभाष: 01346 252143, 252167, 252170
फैक्स: 01346 252174, 252247
तार: "यूनिगढ़"

पत्रांक:शैक्षणिक / 2015 / 894 दिनांक 12.03.2015
13

OFFICE ORDER

A Meeting of Board of Studies, Deptt. of Zoology has been scheduled to be held on 28.03.2015 in the department at Chauras Campus from 10.00 a.m. onwards. All the honourable members are requested kindly to attend the meeting.

This is issued on the recommendation of the Convener, Board of studies, Deptt. of Zoology.

Registrar

Copy to:

1. Chairman BoS, Dept. of Zoology with a request to contact the members of BoS.
2. All members of the Board of Studies, of Zoology.
3. OSD VC(Secretriat) for information of Hon'ble Vice Chancellor.
4. P.A. to Registrar.
5. Dean, School of Life Sciences.
6. Deputy Registrar (Acad).
7. P.A. to F.O.

Dy. Registrar

Agenda

Department of Zoology & Biotechnology

Board of Studies (ZOOLOGY)

Third Meeting **March, 28, 2015**

Venue: Department Conference Room **Time: 10.00 AM**

4.01 Appreciation of contribution made by Prof N Singh as Chairperson and Welcome to the participating members by the Chair.

4.02 Proceedings of the Third Meeting of BOS (Zoology) dated 24.11.2014 are tabled for confirmation **(Annexure 3.02)**

Action Taken Report on the recommendations of the Third Meeting of BOS (Zool) dated 24.11.2014

4.03 Syllabi: B.Sc. Zoology (CBCS system): for approval

4.04 Yearly Progress Reports submitted by respective Ph.D. scholars.

4.05 Presentation of synopsis for Ph.D. registration of 2013 Batch.

4.06 **Consideration of synopses as resubmitted by the Ph.D. scholars** (BOS vide Agenda Items 2.08 Sr. Nos 8, 15, 16 and Registration Letter Nos Acad/2014/678 dated 19/20.09.2014 and Acad/2014/687 dated 19/20.09.2014, Acad/2014/686 dated 19/20.09.2014 as issued by the Univ. Office.
The scholars may be allowed to the presentations and defend their cases.

4.07 Consideration of request submitted by respecting Research Scholars for extension to submit Ph.D. Thesis.

4.08 Allocation of additional grant to the department proportionally to the number of Ph.D. Scholars working as well as to run the Pre Ph.D. course(s),

4.09 **Any other matter (with the permission of Chair)**

4.10 **Concluding Remarks**

4.11 Vote of thanks

16.3.2015

Chairperson/HoD
BOS Zoology Course

Head.
Deptt. of Zoology & Biotechnology
H.N.B. Garhwal University
(A Central University)
Pauri Garhwal-246001, U.K.

Copy to:-
All Hon'ble Members and other concerned

दन बहुगुणा गढ़वाल विश्वविद्यालय श्रीनगर (गढ़वाल),उत्तराखण्ड– 246 174
Nandan Bahuguna Garhwal University, Srinagar (Garhwal), Uttarakhand–246 174

partment of Zoology & Biotechnology

Ref: HNBGU/Zoobiotech/BOS/2015

March, 2015

Subject: Board of Studies (Zoology) – 4th Meeting

Ref: 1. Provisions of relevant Ordinances
2. Notification No: Aca/2015/894 dated 13/3/2015

Clause (s)	Name(s)	
2.1	Prof. A.K. Dobriyal, Dept. of Zoology, Pauri Campus, Pauri	Chairperson
2 (ii) (1)	Prof. J.P. Bhatt, Dept. of Zoology & Biotech, HNBGU, Srinagar	Member
	Prof. N. Singh, [redacted], Dept. of Zoology & Biotechnology, HNBGU, Srinagar	" "
	Prof. B.S. Bisht, Dept. of Zoology, SRT Campus, Tehri	" "
	Prof. S.N. Bahuguna, Dept. of Zoology & Biotech, HNBGU, Srinagar	" "
	Prof. M.S. Bisht, Dept. of Zoology, Pauri Campus, Pauri	" "
	Prof. P. Nautiyal, Dept. of Zoology & Biotech, HNBGU, Srinagar	" "
	Prof. N.K. Agarwal, Dept. of Zoology, SRT Campus, Tehri	" "
	Prof. O.P. Gusain, Dept. of Zoology & Biotech, HNBGU, Srinagar	" "
	Prof. Manju P. Gusain, Dept. of Zoology & Biotech, HNBGU, Srinagar	" "
2 (ii) (2)	Dr.D.K. Sharma, Dept. of Zoology, SRT Campus, Tehri	" "
2 (ii) (3)	Dr. C.B. Kotnala, Dept. of Zoology, Pauri Campus, Pauri	" "
2 (ii) (4)	Prof. P.C. Joshi, Dept. of Zoology & Env. Sc. Gurukul Kangri Univ. Hardwar	" "
	Prof. R.S. Bisht, Dept. of Entomology, GBPUAT, Pantnagar	" "
2 (ii) (5)	Prof. N.S. Panwar, Deptt of USIC, HNBG, Srinagar	" "
	Prof. R.C. Dimri, Deptt of Mathematics. HNBG U. Srinagar.	" "
2 (ii) (6)	Dr. T. Kaur, Dept. of Zoology, MKP College, Dehradun	" "

Respected Sir/Madam,

With reference to Notification Ref. No. Aca/2015/895 dated 13/3/2015 & relevant ordinances your kind attention is drawn as under:

1. Scheduled time and date **28 March, 2015 (10 AM – 2 PM)**
   Venue: Dept. of Zoology & Biotechnology, HNBGU, Srinagar (Chauras Campus)
2. Important points of deliberations will be –
   * Confirmation of minutes of 3rd Meetings
   * Action Taken Report
   * Syllabi etc
   * Yearly Progress Report submitted by Ph.D. Scholars
   * Presentation of synopsis for Ph D by Research scholars (Fresh and Revised)
   * Any other matter by the permission of Chair

   However, detailed agenda will be made available at the start of meeting.
3. Out station participants will be paid TA etc as per norms
4. Confirm your participation to enable undersigned to make necessary arrangements for stay etc.

Thanking you.

Faithfully yours

16/3/2015

(Prof. A.K. Dobriyal)
Chairperson
BOS-Zoology

Head
Deptt. of Zoology & Biotechnology
H.N.B. Garhwal University
(A Central University)

Copy to:
1. All members of the Board of Studies
2. OSD VC (Secretariat) for kind information of Hon'ble Vice-Chancellor
3. PA to Registrar
4. Dean, School of Life Sciences
5. Deputy Registrar (Acad)
6. PA to FO

हेमवती नन्दन बहुगुणा गढ़वाल विश्वविद्यालय श्रीनगर (गढ़वाल),उत्तराखण्ड- 246 174
Hemvati Nandan Bahuguna Garhwal University, Srinagar (Garhwal), Uttarakhand-246 174

Head
Department of Zoology & Biotechnology

E-mail: hodzoobiotech@gmail.com

Ref. HNBGU/Zoobiotech//2020

28 February 2020

To
The Dy. Registrar (Acad.)
HNB Garhwal University
Srinagr Garhwal

Subject: Proceeding of BoS Zoology for approval

R/Sir,

The Proceedings of 17th Meeting of BoS (Zoology) along with report of selection committee of Ph.D. students is enclosed herewith for your kind perusal and approval.

Kindly do the needful and oblige.

Faithfully yours

Head &
Chairperson
BOS (Zoology)

Encl: a a
13 sheets

PROCEEDINGS

DEPARTMENT OF ZOOLOGY AND BIOTECHNOLOGY

BOARD OF STUDIES (ZOOLOGY)

17th Meeting

27 February, 2020

Venue: Departmental Conference Hall **Time: 11am**

In accordance of the relevant provisions of the Ordinances, the Registrar issued the notification Ref. No. Acad/2020/86, dated 20/02/2019 to conduct BoS (Zoology) **(Annexure 17.01)**

Following members participated in the meeting:

1. Prof. BS Bisht Chairperson
2. Prof. N Singh
3. Prof. AK Dobriyal
4. Prof. SN Bahuguna
10. Prof. MS Bisht
11. Prof. P Nautiyal
12. Prof. NK Agarwal
13. Prof. OP Gusain 27.02.2020
14. Prof. Manju P Gusain
10. Prof. PC Lakhera
11. Prof. DK Sharma
12. Prof. DR Khanna
13. Prof. KK Sharma
14. Prof. SC Bhatt
15. Prof. JS Jagwan
16. Dr. RS Fartyal
17. Dr. Tajendar Kaur

Item Nos:

17.01: The Chair welcomed all Hon'ble members for sparing their valuable time and participating in the meeting. As circulated earlier, the agenda items were discussed and following recommendations were made:

17.02: Minutes of the 16th meeting of BoS (Zoology), dated **9 September, 2019** are placed for confirmation **(Annexure 16.02).**

Action Taken Report: The proceeding was submitted to Joint Registrar (Academic) by the Chairperson through Dean, SLS for its approval in Academic Council.

Resolution: Approved

17.03: Interview for selection of candidates for Ph.D. (2019-20).

In all Thirty (30) candidates appeared in the interview for selection to the Ph.D program in Zoology. The list of selected candidates against the allotted seats is enclosed for approval of Hon'ble Vice Chancellor (**Annexure 17.03**).

17.04: Six month Progress Report submitted by respective Research Scholars (Batch 2017)

Resolution: Six monthly progress report (Ph.D.) submitted by the following research students have been approved.

Sr. No.	Name of the student	Report/Duration
1	Deepa Saini	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
2.	Iftikhar Ul Haq	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
3.	Mohd Tariq	I Progress Report (18.11.2017-17.05.2018) II Progress Report (18.05.2018-17.11.2018) III Progress Report (18.11.2018-17.05.2019) IV Progress Report (18.05.2019-17.11.2019)
4.	Neelam Nautiyal	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
5.	Neetika Sharma	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
6.	Prashansha Bachhwan	I Progress Report (14.11.2017-13.05.2018). II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
7.	Priyanka	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)

Dean (SLS)

8.	Shailza Negi	I Progress Report (20.12.2017-19.06.2018) II Progress Report (20.06.2018-19.12.2018) III Progress Report (20.12.2018-19.06.2019) IV Progress Report (20.06.2019-19.12.2019)
9.	Shivani Pharaswan	I Progress Report (21.12.2017-20.06.2018) II Progress Report (21.06.2018-20.12.2018) III Progress Report (21.12.2018-20.06.2019) IV Progress Report (21.06.2019-20.12.2019)
10	Shriya Purohit	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
11	Smita Dangwal	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
12	Sonali Khali	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
13	Sonika Rayal	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
14	Vivek Kumar	I Progress Report (14.11.2017-13.05.2018) II Progress Report (14.05.2018-13.11.2018) III Progress Report (14.11.2018-13.05.2019) IV Progress Report (14.05.2019-13.11.2019)
15	Sharali Sharma	V and Final Report
16	Mushraff Gul	V and Final Report
17	Sandeep Kumar	V and Final Report
18	Asha Rani	IV Progress Report (11.07.2018-10.07.2019) V and Final Report
19	Bijendra Kumar	VI and Final Report
20	Sapana Rani Charak	V and Final Report

17.05: Syllabi for approval (Pre-Ph.D. Zoology, M.Sc. Zoology & B.Sc. Zoology).

17.05.1. Changes were made in the **Pre-Ph.D. syllabus** w.r.t. letter no. Academic/2020/49, Dated 11.02.2020 to include **two (02) Credit Course entitled "Research and Publication Ethics (RPE)"** a Core Compulsory Course in Pre-PhD syllabus. The Credits have been allotted to Courses (Core/Elective) are as per the directions received by email, Dated 25.02.2020 from Prof. A.R. Nautiyal, Convener, Ordinance Committee, HNBGU. Further, in lieu of existing Elective Lab Courses two (02), four credits Courses have been incorporated.
The Revised Pre-Ph.D. syllabus (w.e.f. 2019-2020) approved as follows **(Annexure 17.05.1)**:

Code	Course	Credits	MM
Core-I	Research Methodology	04	100
Core-II	A. Research and Publication ethics (RPE)	02	100
	B. Project Report	01	100
Elective I	A. Tool and Techniques	04	100
	B. Environmental Biology	04	100
Elective II	A. Freshwater Biology, Aquaculture, Fish Biology and Fisheries Science	04	100
	B. Animal Behaviour and Conservation	04	100

17.05.02: Revision in various courses in the M.Sc. Zoology syllabus was approved (**Annexure 17.05.02**).

17.05.03: Two (02) Credits Skill Enhancement Paper entitled "Basic Laboratory Techniques in Zoology" approved for addition in B.Sc. syllabus w.e.f. 2020-21 (**Annexure 17.05.03**).

17.05.04: With reference to letter No. HNBGU/Acad/2019/2096, Dated: 13 November, 2019 as per the minutes of the Academic Council held on 23.10.2019, one Elective Course/Paper in B.Sc. under Discipline Specific Elective Courses (DSE) entitled "Himalayan Faunal Diversity" has been approved for addition to the syllabus **(Annexure 17.05.04).**

17.06: Any other matter by the permission of chair.

17.06.01: Request put up by Ms. Shreya Purohit, Ph.D. student working under the supervision of Dr. Indrashis Bhattacharya, regarding modification in synopsis and addition of a Co-supervisor from NBFGR, Lucknow (**Annexure 17.06.01**).

Resolution: The modifications proposed in title and objective by Ms. Shreya Purohit are approved. The candidate is directed to submit a modified synopsis for approval and all relevant documents required for approval of Dr. Mahendra Singh, Principal Scientist NBFGR as Co-supervisor be submitted. The BoS further, resolved to authourize the Convener of BoS to approve the same on behalf of BoS.

17.06.02: Request put up by Sonika Rayal, Ph.D. student under the supervision of Prof. Manju Prakash Gusain regarding modifications in the objectives of the synopsis (**Annexure 17.06.02**).

Resolution: The modification proposed by Sonika Rayal was approved. The candidate is directed to submit revised synopsis for approval. The BoS further, resolved to authourize the Convener of BoS to approve the same on behalf of BoS.

17.06.03: In reference to letter no. Academic/2020/57, Dated 12.02.2020, the Convener BoS proposed the **Departmental Academic Integrity Panel (DAIP)** for the Department of Zoology & Biotechnology for approval of the BoS as follows (**Annexure 17.06.03**):

a. Chairman – Head of the Department (Prof. B.S. Bisht)

b. Member – Senior academician from outside the department, to be nominated by Hon'ble Vice Chancellor

(i). Prof. S.C. Bhatt, Department of Physics, Birla Campus, Srinagar

(ii). Prof. C.M. Sharma, Department of Botany & Microbiology, Birla Campus, Srinagar

c. Member – A person well versed with anti plagiarism tools, to be nominated by Head of the Department (Prof. A.K. Dobriyal, Zoology Department BGR Campus, Pauri)

Resolution: The BoS approved the DAIP as proposed by the Convener BoS.

17.06.04: The application submitted by Asha Rani, Research Scholar, Regarding granting approval for the maternity leave to her. (**Annexure 17.06.04**).

Resolution: The maternity leave to Asha Rani approved.

17.06.05: The BoS unanimously allotted supervisors to the research scholars of batch 2018-19 as follows:

Sr. No.	Name of the Ph.D. Scholar	Name of the Supervisor
1.	Devendra Singh ~~Rawat~~	Prof. N.K. Agrawal, SRT Campus
2.	Pragya Topal	Dr. R.S. Fartyal, Birla Campus
3.	Priyanka Rana	Prof. P. Nautiyal, Birla Campus
4.	Rakesh Kumar	Prof. O.P. Gusain, Birla Campus

17.06.06: A request letter regarding allotment of two research scholars was submitted to the BOS by Dr Indrashis Bhattacharya. (**Annexure 17.06.06**)

Resolution: The BOS has taken a note of it for consideration in the next allotment.

17.07: Vote of thanks- The meeting concluded with the vote of thanks to the chair.

Chairperson/HOD, BoS Zoology

(Prof. N Singh)

(Prof. AK Dobriyal)

(Prof. SN Bahuguna)

(Prof. MS Bisht)

(Prof. P Nautiyal)

(Prof. NK Agarwal)

(Prof. OP Gusain) 27.02.2020

(Prof. Manju P Gusain)

(Prof. ~~PC~~ Lakhera) 27/02/20

(Prof. DK Sharma)

(Prof. DR Khanna)

Absent
(Prof. KK Sharma)

(Prof. SC Bhatt)

Absent
(Prof. JS Jaggwan)

(Dr. RS Fartyal)

Absent
(Dr. Tajendar Kaur)

(Prof. B.S. Bisht)

Prof R.P. Bhatt
(Dean-School of Life Sciences)

School of Life Sciences
H.N.B. Garhwal University
(A Central University)
Srinagar (Garhwal)-246174
Uttarakhand

Agenda item no. 17.5.01, 02, 03 04 needs approval of School Board.
Submitted for approval on minutes of BOS please.

Registrar 04.06.2020

Hon'ble VC 14/5/20

14/5/20

पाठ्यक्रम समिति जन्तु विज्ञान विभाग की बैठक दिनांक 27.2.2020 में लिए गये निर्णयों में से संलग्न सं० 17.01.02, 03.04 स्कूल बोर्ड में रखा जाना है। शेष मद BOS के समक्ष हैं।

अतः माननीया कुलपति जी से अनुमोदनार्थ प्रस्तुत।

SRCA

Office Order

A meeting of Board of Studies, Department of Zoology Zoology & Biotechnology has been scheduled to be held on 27-2-2020 in Chauras campus from 10:00 A.M/P.M onward. All the hon'ble members are requested to attend the meeting as per the schedule.

This is issued on the recommendation of the Convenor, Board of Studies, Department of Zoology & Biotechnology after approval of hon'ble VC. Only three meeting in an academic session is allowed as per order of hon'ble Vice Chancellor. As such, Department should not hold any further meeting of BOS, if three meetings, including the meeting of this BOS has been conveyed by the Department in this current academic session.

Section Officer
(Academic & Research)

Hemvati Nandan Bahuguna Garhwal University, Srinagar Garhwal

Date: 20.2.2020

Ref.No: Academic/2020/ 86

Copy to :-

1- Convenor-BOS, Department of Zoology & Biotechnology with a request to contact the members of the BOS.
2- All members of the Board of Studies of Zoology & Biotechnology
3- Dean School Life Sciences
4- PS to VC- For kind information of Hon'ble VC.

Section Officer
(Academic & Research)

AGENDA

Department of Zoology & Biotechnology
Board of Studies (Zoology)

17th Meeting

27 February, 2020

Venue: Departmental Conference Hall **Time: 11 AM**

Items Nos:

17.01: Welcome of fellow members by the chair.

17.02: Proceedings of 16th meeting of BOS (Zoology) dated **9 September, 2019** for confirmation.

17.03: Interview for selection of candidates for Ph.D (2019-20).

17.04: Six month Progress Report submitted by respective Research Scholars (Batch 2017).

17.05: Syllabi for approval (Pre Ph.D, M.Sc. Zoology etc).

17.06: Any other matter by the permission of chair.

17.07: Vote of thanks.

Chairperson/HOD
BoS Zoology Course

Copy to:-
All Hon'ble Members and other concerned