NORTH-EASTERNN HILL UNIVERSITY
SHILLONG-793 001

No:AC:44-1/Conf/92- 1344 Dated Shillong the 1st August,1992.

To

The Members of the
Academic Council,
North-Eastern Hill University.

Subject: Agenda papers for the 44th meeting of the Academic Council.

Sir/Ma dam,

I am forwarding herewith the Agenda papers for the 44th meeting of the Academic Council scheduled to be held on the 7th August,1992 at 11:00 A.M. for favour of your information and consideration.

Yours faithfully,

(A. Patton)
Registrar

Enclo:a.a

AGENDA PAPERS FOR THE FOURTYFOURTH MEETING OF THE ACADEMIC COUNCIL

Contents — Page No.

Contd/.../-

Contents Page No.

Contents Page No.

Item No. CONFIRMATION OF THE MINUTES :

(i) Confirmation of the minutes of the 43rd meeting of the Academic Council held on 3/4.3.92.

The minutes of the 43rd meeting of the Academic Council held on 3/4.3.92 was circulated to all members. The comments received from the members are reproduced below for consideration of the Council:

1. Comments from Dr. K.P.Sinha on resolution No.AC:43:92:5:08(vi) regarding Closure of the Institute of Self Organising Systems and Bio-Physics.

(a) " The last line is erroneous. There was a general consensus that the Institute will continue and recommended that a committee be constituted under the Chairmanship of Prof. K.P.Sinha to work out a detail profile of the Institute covering all aspects".

The recording in the minutes was that the Committee is to be constituted with Dr. K.P.Sinha as Convener.

(b) "The Academic Council kept all options including Institute within the purview of the Committee. It was in accordance with the correspondence between the Vice-Chancellor and the University Grants Commission Chairman. The entire correspondence was placed before the Academic Council in its meeting held on 3rd and 4th March, 1992".

The recording in the minutes was that the Committee will work out a detailed profile covering all the academic aspects and desirability for a Department/Centre.

2. Comments from Mr. R.K.Dutta on the 1st para of resolution No. AC: 43:92:5:05(ii) regarding recommendations of the Pre-University Board.

"As per my understanding, it was not resolved to approve the proposal of 30% objective type questions as mentioned in the said para. Rather the entire matter was referred back to the Pre-University Board for re-examination".

As per the recording in the minutes, only the recommendation concerning "Rationalisation of subject combination at Pre-University level" was referred back to the Pre-University Board for re-examinations while other recommendations have been approve by the Council with certain modifications.

Contd/.. 2/-

3. Comments of Dr. K.P.Sinha on resolution No:AC:43:92:5:08(iii) regarding Nomination of external experts to the Institute of Self Organisation Systems and Bio-Physics.

"The Council accepted the nomination of five persons for the Institute Board. There was no rider that it will be kept in abeyance till the final decision is taken on the nomenclature and functioning of the Institute".

The recording in the minutes was that the Council resolved to nominate the five external members to the Institute Board but desired that the constitution of the Board be kept in abeyance till a final decision is taken regarding the nomenclature and function of the Institute.

4. Typographical Error.

In resolution No.AC:43:92:5:01(iii) regarding Amendment of Clause 2 of Ordinance OE-5 on Scales of pay of teaching staff, the revised scale of pay for Lecturer was erroneously typed as "2000-75-2800-100- 4000".

The scale should read as "2200-75-2800-100-4000".

Item No. 3 - RATIFICATION OF ACTION TAKEN BY THE VICE-CHANCELLOR:

(i) Panel of examiners

The panel of examiners in respect of the following M.Phil/ Ph.D candidates have been approved by the respect School Board and Board of Research Studies. The matter is now placed before the Council for ratification:

Department	Name of candidates
Mathematics	1. Ms. I.Choudhuri (Ph.D)
Botany	2. Ms.A Sharma (Ph.D)
Zoology	3. Ms. P.Dhillon (M.Phil)
Institute of Self-Organising Systems and Bio-Physics.	4. Mr. B.G.Mathew (Ph.D)
Philosophy	1. Mr. A.K.Basak (M.Phil)
	2. Mr.A.K.Dash (M.Phil)
Political Science	3. Mr.L.B.Hemkhomang(M.Phil)
	4. Mr.P.Jidung (M.Phil)
	5. Ms.A.Tandon (M.Phil)
	6. Mr.B.Rongphar (M.Phil)
	7. Mr.T.T.Haokip (M.Phil)
Economics	8. Mr.B.Borah (M.Phil)
	9. Mr.J.Sona (M.Phil)
	10. Ms.J.C.Blah (M.Phil)
	11. Mr.K.Laldailova (M.Phil)
	12. Mr.B.Datta (M.Phil)
	13. Ms.M.Badwar (M.Phil)
	14. Mr.R.D.Mazumdar (M.Phil)
History	15. Mr.C.Dothansanga(M.Phil)
	16. Mr.K.Mehta (M.Phil)
	17. Ms.A.Shangpliang(M.Phil)
	18. Ms.Esther Kather(M.Phil)
	19. Ms.W.Mylliemngap(M.Phil)
	20. Mr.V.Bawitlung (M.Phil)
	21. Ms.O.Kannan (M.Phil)
	22. Mr.Y.B.Lotha (M.Phil)

Contd/.../-

Department	Name of candidates
Education	23. Ms.A.Mazumdar (M.Phil)
	24. Ms. B.Kuotsu (M.Phil)
Anthropology	25. Mr.J.W.Dkhar (M.Phil)
	26. Ms.K.K.Mariamma(M.Phil)
	27. Mr.R.Khongsdier(M.Phil)
Sociology	28. Mr.H.Doungol (M.Phil)
	29. Mr.L.L.Tzudir (M.Phil)
	30. Ms.M.Dutta (M.Phil)
	31. Ms.S.L.Kynshi (M.Phil)
	32. Mr.T.M.Longkumer(M.Phil)
Political Science	33. Ms.M.Nandy (M.Phil)
Philosophy	. Mr.E.R.Tongper (Ph.D)
	. Ms.M.Lyngdoh (Ph.D)
	. Mr.K.Vanlalmawia(Ph.D)
	. Mr.S.R.Lyndem (Ph.D)
Political Science	. Ms.E.Jyrwa (Ph.D)
Economics	. Ms.G.S.Das (Ph.D)
Anthropology	. Ms.K.R.Marak (Ph.D)
	. Ms.L.T.Vashum (Ph.D)
	. Mr.H.Lamin (Ph.D)
	. Ms.Amungla Aier(Ph.D)
Sociology	. Mr.R.Ch.Nayak (Ph.D)
Education	. Mr.E.Odyuo (Ph.D)

(ii) Award of Ph.D/M.Phil Degree

The following candidates have been considered by the School Board and Board of Research Studies for award of the M.Phil/Ph.D Degree The respective Board of Research Studies have approved award of the degree and have recommended the cases for ratification by the Academic Council/ Executive Council.

Name of the candidate	Degree awarded	Department
1. Mr.M.Sudarshan	Ph.D	Physics
2. Mr.B.Sahu	Ph.D	Physics
3. Mr.N.K.Choudhury	Ph.D	Physics
4. Miss S.Ghosh	Ph.D	Chemistry
5. R.K.Bhattacharjee	Ph.D	Zoology
6. Ms.J.Chakravarty	Ph.D	Zoology
7. Mr.A.K.Yadav	Ph.D	Zoology
8. Raj Kumar	Ph.D	Botany
9. Ms.S.Kshattriya	Ph.D	Botany
10.Mr.A.Kumar	Ph.D	Botany
11.Mrs.A.R.Laloo	Ph.D	Botany
12.Mr.M.C.Paul	Ph.D	Botany
13.Mr.B.K.Das	Ph.D	Bio-Chemistry
14.Mr.S.N.Singh	Ph.D	Geography
15.Mr.S.Yaden	M.Phil	Geography
16.Ms.Sonali Syam	M.Phil	Geography
17.Ms.Nandini Chakravarty	M.Phil	Geography
18.Ms.Subrata Chakravarty	M.Phil	Geography
19.Mr.Munindra Borah	M.Phil	Geography
20.Mr.Binud Mochaharai	M.Phil	Geography

contd/.../-

Name of candidate	Degree awarded	Department
21. Mr.D.K.Limbu	M.Phil	Anthropology
22. Mr.P.Bhandari	M Phil	Economics
23. Mr.G.Borgohain	M.Phil	-Do-
24. Mr.P.Ch.Nag	M.Phil	-Do-
25. Ms.B.Ksaniang	M.Phil	History
26. Ms.Amita Roy	M.Phil	-Do-
27. Ms.Alfreda L.Lyngdoh	M.Phil	-Do-
28. Ms.Corina Lyngdoh	M.Phil	Pol.Science
29. Mr. J.Mohapatra	M.Phil	-Do-
30. Ms. S.R.Marak	M.Phil	-Do-
31. Ms.K.Chittaranjan	M.Phil	-Do-
32. Ms.S.Sharma	M.Phil	Sociology
33. Shri A.K.Gupta	M.Phil	-Do-
34. Ms. K.S.Mawlong	M.Phil	-Do-
35. Ms.N.Kikon	M.Phil	History
36. Mr.K.Das	M.Phil	Pol.Science
37. Mr.P.Ch.Sarmah	M.Phil	Economics
38. Mr.P.Malngiang	M.Phil	Pol.Science
39. Ms.E.Dkhar	M.Phil	-Do-
40. Ms.S.Dutta	M.Phil	Economics
41. T.M.Baruah	M.Phil	Pol.Science
42. Ms.Mimi	M.Phil	-Do-
43. Ms.Sara Lyndem	M.Phil	Economics
44. Ms.A.Chakraborty	M.Phil	Philosophy
45. N.J.Sarmah	M.Phil	Economics
46. Ms.N.Soukhrie	M.Phil	Pol.Science

Contd/.../-

Name of the candidate	Degree awarded	Department
47. Ms.K.Angami	M.Phil	Pol Science
48. Mr.Bimal Riang	M.Phil	Anthropology
49. Ms.E.Tariang	M.Phil	Economics
50. Mr.R.K.Phukan	M.Phil	-Do-
51. Mr.Lalnuntluanga	M.Phil	-Do-
52. Ms. A.Brahma	M.Phil	History
53. Ms.J.Lyngdoh	M.Phil	-Do-
54. Ms.S.Zhimomi	M.Phil	-Do-
55. Mr.R.Lalzawnga	M.Phil	Pol.Science
56. Ms.Ruma Das	M.Phil	-Do-
57. Mr.A.K.Nongkynrih	M.Phil	Sociology
58. Ms.Aniema Nongkhlaw	M.Phil	-Do-
59. Mr.B.Laltanpuia	M.Phil	-Do-
60. Mr. E.T.Nongsiang	M.Phil	-Do-
61. Ms. L.M. Shangpliang	M.Phil	Sociology
62. Mr. R.Khongsdier	M.Phil	Anthropology
63. Mr. Y.B.Lotha	M.Phil	History
64. Mr.T.T.Haokip	M.Phil	Pol.Science
65. Mr.L.Y. Longcher	M.Phil	Sociology
66. Smt. S.M.Sungoh	Ph.D	Education
67. Mr. H.I.Singh	Ph.D	-Do-
68. Ms. Manjulika Bhattacharjee	Ph.D	History
69. Ms. Archana Baruah	Ph.D	Philosophy
70. Sipra Naik	Ph.D	Education
71. Caroline Ngailiankim	Ph.D	-Do-
72. Lalliani Ralte	Ph.D	-Do-

Contd/.../-

Name of the candidate	Degree awarded	Department
73. Neena Chakravorty	Ph.D	Education
74. B.Kuotsu	M.Phil	Education
75. Angira Mazumdar	M.Phil	Education
76. Ruby Dkhar	M.Phil	Education
77. Lalsangliani	M.Phil	Education

(iii) Nomination of external experts to the School Boards

In accordance with the provisions of the Ordinance, five external experts are to be nominated by the Academic Council to each of the School Boards.

The Vice-Chancellor has nominated the following external experts to the respective School Boards and the nominations are now placed before the Academic Council for ratification :

School Board of Social Sciences :-

1. Prof. A.K.Danda,
   Department of Sociology and Social Anthropology,
   North Bengal University,
   Siliguri.
2. Dr. G.P.Thakur
   Prof. of Psychology,
   Kashi Vidyapeeth University,
   Varanasi.
3. Prof. Pravin J.Patel,
   Department of Sociology
   M.S. University of Baroda.
4. Dr.Ranjeet Sen,
   Department of History,
   Ravindra Bharati University,
   Calcutta.
5. Prof Birendranath Datta,
   Department of Folklore Research,
   Gauhati University,
   Guwahati.

School Board of Education :-

1. Prof S.N.Singh,
   Retd. Professor,
   C/O Globe Book Agency,
   Lanka,Varanasi - 5
2. Prof. S.P.Bhattacharjee,
   Department of Education,
   Utkal University,
   Bhubaneswar.
3. Prof. Govinda,
   National Institute for Educational Planning and Administration,
   Sri. Aurobindo Marg,
   New Delhi- 16.
4. Prof. S.K.Paul,
   Department of Education,
   Allahabad University,
   Allahabad.

contd..../-....

School Board of Languages :-

1. Prof. B.D.Singh,
   Head, Department of English,
   Gauhati University,
   Guwahati.
2. Prof. V.D.Singh,
   CIEFL, Hyderabad.
3. Prof. A.Jankiram,
   Department of English,
   Rajasthan University,
   Jaipur.
4. Rev.Fr(Dr) Sngi.S.Lyngdoh,
   Sacred Heart Th.College,
   Mawlai - Shillong - 8
5. Rev(Dr) J.F.Jyrwa,
   K.J.P. Synod House,
   Shillong.

School Board of Library and Information Science:

1. Prof. P.B.Barua,
   Department of Library and Information Science,
   University of Burdwan,
   Burdwan - 713 014.
2. Prof. M.Mohapatra,
   Utkal University,
   Vani Vihar,
   Bhubaneswar, District Puri,
   Orissa - 751 004.
3. Prof. Y.P.Dubey,
   Department of Library and Information Science,
   Banaras Hindu University,
   Vanarasi - 221 005.
4. Prof. Krishna Kumar,
   Department of Library and Information Science,
   University of Delhi,
   Delhi- 110 007.
5. Prof K.S.Ragavan,
   Department of Library and Information Science,
   University of Madras Triplicane (P.O.)
   Madras - 600 005.

(iv) Nomination of a member to the Affiliation Committee

Prof B.Pakem was earlier nominated as member to the Affiliation Committee, but consequent upon assumption of the Office of the Vice-Chancellor, Prof M.S.Sangma has been nominated by the Vice-Chancellor, to serve as member in the Affiliation Committee.

The nomination of Prof M.S.Sangma is now placed before the Council for ratification.

(v) Nomination of members to the Board of Under-Graduate Studies.

In accordance with the provisions of the Ordinance OA-9, composition of the Board of Under-Graduate Studies in subjects not taught at Post Graduate level includes, amongst others, nomination of 3 members not below the rank of Readers, by the Academic Council.

The Vice-Chancellor has nominated the following persons not below the rank of Readers for the respective Board of Under-Graduate Studies and the nominations are now placed before the Council for ratification :

Board of Under-Graduate Studies in Bengali.

1. Prof J.B.Bhattacharjee,
   Department of History, NEHU, Shillong.
2. Dr. Pallab Sengupta,
   Department of Bengali,
   Rabindra Bharati University,
   Calcutta.
3. Dr. Soumen Sen,
   Centre for Literary & Cultural
   Studies, NEHU, Shillong.

Board of Under-Graduate Studies in Home Science.

1. Prof A.N.Rai,
   Department of Bio-Chemistry,
   NEHU, Shillong.
2. Dr. M.Y.Khan,
   Reader, Department of Bio-Chemistry,
   NEHU, Shillong.
3. Dr. Ramesh Sharma,
   Reader, Department of Bio-Chemistry,
   NEHU, Shillong.

(vi) Nomination of NEHU representatives to the Governing Body of affiliated Colleges.

The Vice-Chancellor has nominated the following teachers as University representatives in the Governing body of various affiliated colleges. The nominations are now placed before the Council for ratification :

Name of the College	Name of the University representatives.	Term
1. Women's College Shillong.	(i) Dr(Mrs)R.Borgohain, Deptt. of Pol.Science	3 years w.e.f. 1-8-91
	(ii) Dr(Mrs)B.Lyndem, Centre for Adult & Continuing Education.	-do-
2. Don Bosco College Tura.	(i) Dr.A.K.Ghosh Deptt. of Anthropology	3 years w.e.f. 1.8.91
	(ii) Dr(Mrs)M.Momin, Deptt. of History	-do-
3. Sankardev College Shillong.	(i) Prof S.N.Bhat, Deptt. of Chemistry	3 years w.e.f. 1.8.90.
	(ii) Dr(Mrs)R.Borgohain, Deptt. of Pol.Science	-do-
4. Synod College Shillong.	(i) Dr.L.S.Gassah, Deptt. of Pol.Science	3 years w.e.f. 15.11.90
	(ii) Dr.C.Nunthara Deptt. of Sociology	-do-
5. Upper Shillong College.	(i) Prof M.Miri Deptt. of Philosophy	3 years w.e.f. 16.6.92
	(ii) Dr.K.M.Warjiri, Centre for Adult & Continuing Education	-do-
6. P.G.T.College, Shillong.	(i) Prof(Mrs)K.S.Lyngdoh Deptt. of Education	3 years w.e.f. 22.6.90
	(ii) Dr. B.K.Dev Sarma, Director, CDC.	-do-
7. Pirot Singh M. College.	(i) Dr.D.R.Syiemlieh Deptt. of History	3 years w.e.f. 2.9.91
	(ii) Prof(Mrs)T.Ao Deptt. of English	-do-
8. Sohra College, Cherrapunji	(i) Dr.L.Gassah, Deptt. of Pol.Science	3 years w.e.f. 1.8.90
	(ii) Dr(Mrs)H.Giri Deptt. of History	-do-

4.1(1)

4:1 — Deferred Item

(i) Proposal for amendment of Ordinance OB-6 regulations Affiliation of Colleges and Ordinance OB-7 on the College Development Council.

In the 43rd meeting held on 3 & 4.3.92 a proposal for amendment of Ordinances OB-6 and OB-7 was placed before the Academic Council but the Council deferred consideration of the matter and desired that the amendment be placed in a comparative form of the existing provisions and the proposed amendments.

The Director, College Development Council has submitted theproposed amendments of Ordinance OB-6 and its Regulations and Ordinance OB-7 in a comparative form.

The proposed amendments are placed at Annexure A and B respectively for consideration of the Council.

ANNEXURE-A

OB 6

ON THE AFFILIATION OF COLLEGES
(STATUTE 33(O)(ii) OF THE SCHEDULE TO THE NEHU ACT, 1973)

ESTABLISHMENT OF A NEW COLLEGE

Existing	Proposed Amendment
1.(1)When it is proposed to establish a new college, the sponsoring body, on the case of a Government college, the Head of the Department concerned, shall submit an application to the Registrar in a prescribed form not later than August 15 of the preceeding year in which it is intended to start the college.The application should be accompanied by a project report giving details as laid down in the Regulations.	When it is proposed to establish a new college the sponsoring body, on the case of a Government of the State concerned, shall submit an application to the Registrar in a prescribed form not later than the 15th of May of the preceeding calendar year in which it is intended to start the college.The application should be accompanied by a project report giving details as laid down in the Regulations.

INTIAL SCREENING OF THE APPLICATION.

2. On receipt of the application along with the prescribed fee, the Affiliation Committee of the Academic Council shall scrutinize the application and seek any further clarification from sponsoring body either in writing or through a representative. The Committee thereafter, shall offer its recommendation to the Academic Council as to whether they are satisfied with the project report and that there is a prima facie case for starting a college.	The application will be examined by the College Development Council.The Committee thereafter, shall offer its recommendation to the Academic Council as to whether they are satisfied with the project report and that there is a prima facie case for starting a College.

INSPECTION COMMISSION

3(1)(a)The Academic Council, after considering the report of the Committee, may appoint an Inspection Commission. The Commission shall comprise not less than three members which shall include the Director of Public Instruction/Director of Education of the unit in which the College is located or his nominee as one of the members.	The Academic Council after considering the report(of the Committee) may appoint an Inspection Team. The Team shall comprise not less than three members one of whom shall be the Director of Public Instruction/Director of Education or the State concerned.
(1)(b)The Inspection Commission may take necessary steps to examine the request, inspect the site and submit its report to the Academic Council on the need for the proposed College.The suitability of the site, feasibility of plans submitted, the adequacy of the physical and financial resources offered. And also make suitable recommendation for granting the permission to start the College.	The Inspection Team may take necessary steps to examine the request, inspect the site & submit its report to the Director College Dev.Council. The report shall cover the following aspects(i) the suitability of the site(2)feasibility of plans submitted(3)the

contd.

4:1/2(3)

Existing	Proposed Amendment
FIRST PERMISSION:	adequacy of the physical and financial resources offered.
(2)A new college may ordinarily be permitted, in the first instance, to start the Pre-University Course only. Provided in the case of an institution sponsored by the Government or by an Education Society of standing, permission may be granted to start the Pre-University and degree courses simultaneously, subject to the first proviso above.	A new college may ordinarliy be permitted, in the first instance, to start the Pre-University course only. Provided that where a State Govt. decides to take over the conduct of the plus 2 stage of Higher Secondary education permission to start P.U. course in a new college shall not be given. Affiliation and permission may considered directly for the degree course.
TIME SCHEDULE FOR APPLICATION ETC.	
4(1)The request for permission to open a college/renewal of provisional affiliation/permanent affiliation in an academic session shall be made before the 15th May of the preceeding year. The Affiliation Committee shall meet as soon as possible and submit its recommendations to the Academic Council not later than 30th July. The Inspection Commission which shall be appointed by the Academic Council shall submit its report before the end of November The decision on permission to start the college shall ordinarily be communicated by the University not later than 31st October.	The request for permission to open a college/renewal of provisional affiliation/permanent affiliation in an academic session shall be made before the 15th May of the preceeding year to the Director, College Dev. Coundl for consideration by the Academic Council. The Inspection Commission which shall be appointed by the Academic Council shall submit its report before the end of October. The decision on permission to start the College shall ordinarily be communicated by the University not later than 31st December.
OPENING OF A NEW FACULTY IN AN EXISTING COLLEGE	
(2)When it is proposed to open a new faculty in an existing college yhe sponsoring body, or in the case of a Govt. college, the Head of the Department concerned, shall submit an application to the Registrar not later than May 15 of the preceding year in which it is intended to open the faculty. The application shall be accompanied by a project report giving details as laid down in the Regulations.	When it is proposed to open a new faculty in an existing college, the sponsoring body or in the case of a Govt. College, the concerned Director of Education, shall submit an application to the Registrar not later than May 15, of the preceeding year in which it is intended to open the faculty. The applicatin shall be accompanied by a project report giving detailed as laid down in the Regulations.

PRELIMINARY STEPS BY THE SPONSORING AUTHORITY FOR AFFILIATION

Existing	Proposed Amendment
5(2) No person who is not fully qualified as per the norms laid down by the University for the purpose shall be appointed on the staff of the college or as Principal. In exceptional cases, if a fully qualified Principal is not available one of the members of the staff having longest teaching experience at the college level may be designated as Vice-Principal and the post of the Principal may be kept vacant untill such time as a fully qualified persons is recruited.	No person who does not fulfil the prescribed the qualifications laid down by the University for the purpose shall be appointed on the staff of the college.

APPLICATION FOR PROVISIONAL AFFILIATION

6.(2) The Governing Body of the college shall inform the University forthwith about the appointments and also of the fact that the college having been stated, not later than 15 days after the beginning of the academic session and make an application for provisional affiliation to the University.	DELETE

DEGREE COLLEGES

9(1) Pass Courses: The application for permission to start a degree college, shall be submitted by the college to the Registrar before May 15 of the preceeding year in which it is intended to start in accordance with the Regulations on the subject.	The application forppermission to start a degree college, shall be submitted by the College to the Director, College Dev.Council before 15 May of the preceeding year in which it is intended to start in accordance with the Regulations on the subject.
(2) Honours courses: The application for permission to start Honours classes in any subject viz. the third years of the three degree course shall be submitted by the college to the Registrar before May 15, of the preceeding year in which it is intended to start the Honours classes in the prescribed form in accordance with the regulations on the subject. Provided that such a request will be considered only if the results in the concerned subject in the examinations at the end of the second year of the three year degree course in the preceeding 3 years have been satisfactory.	The applications for permission to start a degree college, shall be submitted by the college to the Director, College Dev.Council before May 15 of the preceeding year in which it is intended to start in accordance with the Regulations on the subject. The application for permission to start Honours classes in any subject shall be submitted by the college to the Director College Dev.Council before May 15; of the preceeding year in which it is intended to start the Honours classes in the prescribed form in accordance with the regulations on the subject. Provided that such a request will be considered only if the results in the concerned subject in the degree Pass Course examinations in the preceeding 3 yrs. have been satisfactory.

EXISTING.	PROPOSED AMENDMENT
Provided further that the permission to the Colleges which were allowed to each honours courses in the older system will be considered on the basis of the results in the honours classes & such other conditions as may have been laid down in the Regulations.	DELETE.

THE AFFILIATION COMMITTEE

i) Vice-Chancellor or - Chairman Pro-Vice-Chancellor	i) Vice-Chancellor or -Chairman Pro-Vice-Chancellor.
ii) DPI/Director of - Member Education or his nominee from each of the three units	ii) Registrar - Member -
iii) Two nominees of the - Member - Academic Council.	iii) DPI/Director of Education or his - Member - nominee from each of the three units.
iv) Registrar or any - Member - other officer Secretary. nominated by the Vice-Chancellor.	iv) Two nominee of the-Member- Academic Council.
	v) Director, College - Member- Dev.Council -Secretary

AFFILIATION AND OTHER FEES

i) Request for permission - Rs.1000.00 to open a new college.	i) Rs.2000/=
ii) Request for renewal of Rs 300.00 provisional affiliation/ permanent affiliation.	ii) Rs. 1000/=
iii) Permission to open a Rs. 300.00 new course/subject.	iii) Rs. 500/=
iv) Annual enrolment fee @ 1/=per students on rolls as on the closing day of admission of the year subject to a minimum of. Rs. 300.00	iv) Rs. 1000/500/-
v) Reserve fund in long term fixed deposits in the name of the college.	

For P.U.College- Rs.1,00,000.00.
For degree college Rs.2,00,000.00.
For Hons.College. Rs.3,00,000.00.

Fees once paid shall not be refunded.

4;5/(6)

Existing	Proposed Amendment
QUALIFICATION OF TEACHING STAFF	
19.(3)Lecturer:General:	
(a)Consistantly good academic record with at least High Second class Masters' degree in a relevant subject or equivalent; and	(a) Consistantly good academic record with qualifications prescribed by the U.G.C.
(b) An M.Phil degree or a recognised degree beyond the Masters' level OR published work indicating the capacity of a candidate for independent research work OR diploma of one years' duration in teaching of the subject (for posts in English or Foreign language)	Delete
(4) Lecturer in MIL(in which normal post graduate education has been/has not been started).	
(a) Consistently good academic record with High II Class Masters' degree in the language concerned; and	Consistently good academic record with High II Class Masters' degree (55%) in the language concerned; and
(b) An M.Phil degree in any subject or research work of an equally high standard.	Delete
OR	
(a) Consistently good academic record with a High II class Masters' degree at any subject and at least 60% marks in the language concerned at Degree examination;	(a) Consistently good academic record with a High II class Masters' degree(55%) at any subject and at least 60% marks in the language concerned at degree examination;
(b) An M.Phil degree in any subject	(b) Delete
EXPLANATION: Consistently good academic record means a candidate must have obtained at least midpoints in First and Second division marks in aggregate at the Degree/Honours and Masters-degree level.	Delete
TUTORS OR DEMONSTRATORS	
(5)A tutor or a Demonstrator, irrespective of his actual designation and payscale, shall for the purpose of this ordinance mean one whose qualification is at least a Bachelor Degree, Preferably with Honours of the subject in question as one of his subject in the degree examination.	Delete
(6)Appointment of teaching staff, including the Principal of the college, shall be made by proper advertisement and by the Governing Body subject to approval by the University except in case where this matter is governed by suitable rules if any, of the Government concerned duly framed for the purpose.	Delete

4:1(7)

Existing	Proposed Amendment
DUTIES OF TEACHERS	
20. Duties of the teachers shall be as prescribed by the Regulations.	20. Delete
MINIMUM NUMBER OF CLASSES PER WEEK	
21. The time-table of a college shall provide for the minimum number of classes per week for a subject as prescribed by Regulations.	21. Delete
MINIMUM STAFFING REQUIREMENT	
22. The minimum staffing requirement of a college shall be as provided in the Regulations. No college shall be granted affiliation if it fails to satisfy such minimum requirement.	22. Delete
ACCOMMODATION AND EQUIPMENT	
23. Every college shall provide suitable accommodation for class rooms, laboratories, library and administration as prescribed in the Regulations.	23. Delete
LIBRARY	
24. Every College must have a well equipped Library as per provisions of the Regulations in this regard.	24. Delete
SIZE OF CLASSES	
25. Every college should follow the norms laid down by the University about the size of classes which may be prescribed by Regulations.	25. Delete

4:1(8)

REGULATIONS 7 REGULATIONS - 4
OB-6/ R - 5

Existing

NORMS OF LIBRARY BOOKS

Proposed Amendment.

1. Pre-University

A college providing instruction for Pre-University Course only shall be required to have a basic minimum 1000 books for the compulsory subjects and in addition 200 books for each of the elective subjects offered by the College. In addition the Library must have 100 books per student enrolled @ 50/-per book and must subscribe to at least 5 journals in different subjects.

A college providing instruction for Pre-University Course only shall be required to have copies of all the text books for the subjects for which they are affiliated in the ratio of one copy for every five students. The Library must also subscribe to at least five news magazines & Popular informative periodical e.g. Science Today, etc.

2. B.A./B.Sc/B.Com.

A College imparting instruction for Degree Course must have a basic minimum subjects and in addition 500 books for each of the elective subjects offered. Furtner a college Library must have 15 books per student enrolled @ /.75 per book. and per and should subscribe at at least 10 journals in the various subjects.

A college imparting instruction for Degree Course must have multiple copies of text books and books which are prescribed in the syllabus in the ratio of one copy for every five student. Besides the college must also have in its library minimum of 1000 volumes of reference books of general literary and schoolarly value. The library should also subscribe to at least 5 journals in addition to those subscribed at the P.U. Level.

3. Honours.

A College imparting teaching in an Honours subject must have in its library a basic minimum of 500 books in the subject concerned & in addition 25 books per student enrolled @ Rs. 100 per book. The college library should also subscribe to at least 3 journals in the subject of Honours As a general policy each College should provide with a fund to the tune of 10% in addition to the above norms in its budget.

A College imparting teaching in an Honours subject must have in its library multiple copies of each subject. The college library should also subscribe to atleast 2 journals in the subject of Honours.

4:1(9)

NORM OF NUMBER OF STUDENTS TO BE ADMITTED IN VARIOUS CLASSES

Existing	Proposed Amendment
(i)The number of students to be admitted to Pre-University science and first and second year of the Bachelor of Science Courses shall ordinarily not exceed 40 in each section. This may however be increased to 50 by the Principal of the college, if the exigencies arise. In case the number of students exceeds 50, the Class shall be split into two or more sections so as to bring them within the prescribed norm.	The number of studetns to be admitted to Pre-University Science and First and Second Year of the Bachelor of Science Courses shall ordinarily not exceed 40 in each section. This may however, be increased to 50 by the Principal of the College. In case the number of students exceed 50, the class shall be split into two or more sections so as to bring them within the prescribed norms.
(ii)The number of students to be admitted to the third year of the Bachelor of the Science Course shall not ordinarily Exceed 30 in each section which may be increased in 40 by the Principal of the college if the exigencies arise. In case the number of students exceeds 40 the class shall be split into two or more sections so as to bring them within the prescribed norms.	The number of students to be admitted to the third year of the Bachelor of the Science Course shall not ordinarily exceed 30 in each section which may be increased to 40 by the Principal of the College. In case the number of students exceeds 40, the class shall be split into two or more sections so as to bring them within the prescribed norms.
2. Pre-University Arts and Bachelor of Arts.	
(i)The number of students in Pre-University Arts & Bachelor of Arts-First and Second Year Courses shall ordinarily not exceed 50. This may be increased to 60 by the Principal of the College concerned if the exigencies arise. In case there are more than 60 students, the class shall be split into two or more sections so as to bring them within the prescribed norms.	The number of students in Pre-University Arts & Bachelor of Arts-First & Second Year courses shall ordinarily not exceed 50. Principal of the college concerned. In case there are more than 60 students, the class shall be split into two or more sections so as to bring them within the prescribed norms.

4:1(10)

REGULATIONS

DS 6½R-7

ON NUMBER OF STUDENTS IN CLASS IN COLLEGES
(Under Section 33 of the North-Eastern Hill University Statutes).

EXISTING	PROPOSED AMENDMENT
2. These Regulations shall come into force with immediate effect subject to relaxation as may be given by the Vice-Chancellor in a specific case of category of cases.	These Regulations shall come into force with immediate effect.
3(1) The size of theory section in the Pre-University(Science) and first two years Bachelor of Science courses shall be ordinarily 40 students. This may be increased to 50 by the Principal of the College.	The size of theory classes in the Pre-University(Science) and first two year Bachelor of Science courses shall not exceed 40 students. The number may be increased to 50 students by the Principal of the College.
(2) The size of theory section in the third year of the Bachelor of Science course shall be 30 which may be increased upto 40 by the Principal.	The size of theory class in the third year of the Bachelor of Science course shall not exceed 40 students.
(3)(a) The size of practical section in the Pre-University(Science) and Bachelor of Science 1st/2nd year courses shall be 20 students.	The size of a practical class in the Pre-University (Science)& Bachelor of Science 1st/2nd year courses shall not exceed 20 students.
(b) The size of practical classes in each section of the Bachelor of Science 3rd year/Honours courses where applicable shall not be more than 20 students.	The size of a practical class in each section of the Bachelor of Science, Honours courses shall not exceed 20 students.
4. Size of classes in Pre-University (Arts)& Bachelor of Arts excluding (Mathematics/Statistics):	The size of a class in Pre-University(Arts)&Bachelor of Arts excluding(Mathematics/ Statistics):
(1) The size of each section in the Pre-University(Arts)& the 1st and 2nd year of Bachelor of Arts shall be ordinarily 50 which may be increased upto 60 by the Principal.	The size of a class in the Pre-University(Arts)& the 1st and 2nd year of Bachelor of Arts shall not exceed 50 students.
In case there are more than 60 students in a course the class shall be split into two or more sections so as to bring them witnin the prescribed norms.	In case there are more than students in a class the class shall be split into two or more sections so as to bring them within the prescribed norms.
(2) The size of each section in the third year of the Bachelor of Arts course shall ordinarily not exceed 40, it may be increased upto 50 by the Principal.	The size of each section in the third year of the Bachelor of Arts class shall not exceed 50 students.

Existing	Proposed Amendment
In case there are more than 50 students in a course, the class shall be split into two or more sections so as to be in conformity with these Regulations.	In case there are more than 50 students in a class, the class shall be split into two or more sections so as to be in conformity with these Regulations.
5.(a) The size of a section in the Pre-University(Commerce) and Bachelor of Commerce courses in respect of Accountancy and Statistics shall be governed by Regulations 3 above.	The size of a class in the Pre-University(Commerce) and Bachelor of Commerce courses in respect of Accountancy and Statistics shall be governed by clause 3 above.
(b) The size of classes in respect of other subjects shall be governed by Regulations 4 above	The size of classes in respect of other subjects shall be governed by clause 4 above.

6. Transitional Provisions:-

All affiliated colleges shall adopt these norms as early as possible but the transition shall be completed before the beginning of academic session 1985-86.	Delete
Provided that all colleges which may be allowed to start teaching of the third year of the new three year degree course with effect from 1984-85 or thereafter shall be admitted to the privileges of the University in respect of that course only if they adopt the new norms.	Delete

4:1(12)
11

ANNEXURE-B

OB 7 ON THE COLLEGE DEVELOPMENT COUNCIL
(Section 26(1) (m) of the NEHU Act 1973)

Existing	Proposed Amendment
Composition of the Council - 4. The Council shall consist of the following members.	
(i) Vice-Chancellor-Chairman, Ex-officio	(i) Vice-Chancellor -Chairman Ex-officio
(ii)Pro-Vice-Chancellors - Members, Ex-officio	(ii)Pro-Vice-Chancellors -Members, Ex-officio.
(iii)Four teachers of the Post-graduate Deptts., of which two will be from Sciences and two from Humanities to be nominated by the Vice-Chancellor	(iii) Two teachers of the University to be nominated by the Vice-Chancellor. - Members
(iv) Six Principals of affiliated colleges, one each from Meghalaya NAgaland and Mizoram, by rotation. Out of which at least four will be from colleges having Degree Courses - Members	(iv)Three Principals of affiliated colleges, one each from Meghalaya, Nagaland and Mizoram, by rotation. - Members
(v) Six teachers of the affiliated colleges, two each from Meghalaya, NAgaland and Mizoram, to be nominated by the Vice-Chancellor. - Members	(v) Three teachers of the affiliated colleges, one each from Meghalaya, Nagaland and Mizoram, to be nominated by the Vice-Chancellor. - Members
(vi)Director of Public Instruction/Education of Meghalaya,Nagaland and Mizoram. - Member,Ex-officio	(vi) Director of Public Instruction/Education of Meghalaya,Nagaland and Mizoram. -Member, Ex-officio
(vii) The Dean of Students' Welfare,NEHU -Member, Ex-officio	(vii) The Dean of Students' Welfare,NEHU - Member, Ex-officio
(viii)The Director of Sports, NEHU. - Member, Ex-officio	(viii) The Director of Sports NEHU. -Member, Ex-officio
(ix) The Registrar,NEHU - Member	(ix) The Registrar,NEHU - Member, Ex-officio
(x)The Finance Officer,NEHU	Delete
(xi)The Controller of Examination,NEHU	Delete
(xii) The Librarian, NEHU	Delete
(xiii) The Director College Dev. Council, NEHU. - Member-Secretary Ex-officio	(xiii) The Director College Dev. Council,NEHU. - Member-Secretary-Ex-officio

Existing	Proposed Amendment
TERM OF OFFICE OF MEMBERS	
5. The term of office of members, other than Ex-oficio shall be two years. They will be eligible for reappointment, except in cases where the appointment is by rotation, in which case they will wait for their turn to become members again.	The term of office of members, other than Ex-Officio members shall be two years and they will be eligible for reappointment, except in cases where the appointment is by rotation, in which case they will wait for their turn to become members again.
FILLING UP OF CASUAL VACANCIES	
6. Any vacancy arising due to illness, death or resignation or other-wise shall be filled up as soon as may be convenient and member or member (s)so appointed shall continue in office for the residue of the term of office of the member or members concerned whose vacancy they fill up.	Any vacancy arising due to illness, death or resignation or otherwise, shall be filled up as soon as may be convenient and the member(s) so appointed shall continue in office for the residue period of the member(s) concerned whose vacancy they fill up.
QUORUM/	
7. Seven members of the Council shall form the quorom for the meetings of the Council.	Five members of the Council shall form the quorom for the meetings of the Council.
MEETING/	
8. (1) The Council shall meet at least twice in an academic year and meetings shall be convened by the Director, College Development Council, in consultation with the Vice-Chancellor, the Pro-Vice-Chancellor present, and in case of more than one Pro-Vice-Chancellor, the senior most Pro-Vice-Chancellor shall preside over the meetings of the Council. If there is no Pro-Vice-Chancellor present then the members present will elect a member from among themselved to preside over that meeting.	The Council shall meet at least twice in an academic year and meetings shall be convened by the Director, College Development Council, in consultation with the Vice-Chancellor. In the absence of the Vice-Chancellor, the senior most Pro-Vice-Chancellor present, shall preside over the meetings of the Council. If there is no Pro-Vice-Chancellor present then the members present will elect a member from among themselves to preside over that meeting.
(2) A special meeting of the Council may be convened if a request to that effect is received by the Vice-Chancellor in writing from not less than six members of the Council giving a notice of at least 21 days.	A special meeting of the Council may be convened if a request to that effect is received ny the Vice-Chancellor in writing from not less than five members of the Council giving a notice of at least 21 days.

.....

Existing		Proposed Amendment
FUNCTIONS OF THE COUNCIL		
(vi) to review the examination system and suggest innovations and improvement.		to review the examination system in respect of colleges affiliated to the University and to suggest innovations and improvement.
STANDING COMMITTEE		
12. There shall be a Standing Committee of the Council for each of the campuses of Nagaland and Mizoram which will be responsible to the Council.		Delete
Provided the Standing Committee shall function in relation to the area under its jurisdiction, within the general functions as enumerated under Clause 10.		Delete
COMPOSITION OF THE STANDING COMMITTEE		
13(1) The Composition of the Standing Committee shall be as follows:		Delete
(i) Pro-Vice-Chancellor of the Campus concerned.	Chairman Ex-officio.	Delete
(ii) Director of Public Instruction/Education of the State, Union Territory concerned	Member Ex-officio.	Delete
(iii) Director, College Development Council.	Member Ex-officio.	Delete
(iv) Two teachers from the Departments of the Campus concerned, not below the rank of a Reader, to be nominated by the Vice-Chancellor	Members	Delete
(v) Two Principals of the affiliated colleges from the State or Union Territory concerned, to be nominated by the Vice-Chancellor.	Members	Delete
(vi) Two teachers from the affiliated colleges of the State or Union Territory concerned to be nominated by the Vice-Chancellor.	Members	Delete
(vii) Regional Director, College Development Council.	Member-Secretary.	Delete
(2) If there is no Pro-Vice-Chancellor or in his absence the Standing Committee shall elect a member from amongst themselves to be the Chairman of that Meeting.		Delete

4:1(15)

Existing	Proposed Amendment
TERMS OF OFFICE OF MEMBERS OF STANDING COMMITTEE	
14. The term of office of members, other than Ex-officio, shall be two years. They shall be eligible for reappointment.	Delete
FILLING UP OF CASUAL VACANCIES	
15. The filling up of casual vacancies will be the same as in the case of the Council as provided in clause 6 of this Ordinance.	Delete
QUORUM	
16. Four members shall form a quorum for the meeting of the Standing Committee	Delete
REMOVAL OF DIFFICULTIES	
17. Any difficulty arising in giving effect to, or interpretation of, any on the provisions of this Ordinance, shall be referred to the Vice-Chancellor whose decision thereon shall be final.	Any difficulty arising in respect of any of the provisions of this Ordinance shall refer the matter to the Academic Council and Executive Council as necessary.

5:1- Statutes,Ordinances,Regulations & Rules.

(i) Revision of the University Regulation on Qualification of teachers.

The UGC Regulations, 1991 on Qualification of teaching staff were approved by Academic Council in its 41 nd meeting held on 3/4.3.92 and by the Executive Council in its meeting held on 9.3.92.

Subsequantly the existing University Regulation 3 of Ordinance OE-5 placed at Annexure A, needs to be revised in order to lay down the qualification prescribed by the UGC Regulation, 1991.

Accordingly a Draft Revised Regulation on qualification of University teachers, is placed at Annexure - B for consideration of the Council.

ANNEXURE - A

5:1:1(2)

Regulation-3
OE-5

Existing Regulations

ON QUALIFICATIONS OF UNIVERSITY TEACHERS

1. Professor :
Essential- An outstanding scholar with established reputation and significant contribution to the subject;

Or

(i) Doctorate in the subject or equivalent ;

(ii) Ten years' teaching experience of Post-Graduate classes or fifteen years teaching experience including five years of Post-Doctoral Research experience and guidance.

2. Reader :
Essential- (i) Doctorate in the subject or equivalent.
(ii) Five years teaching experience with atleast three years of Post-Graduate classes OR seven years with five years honours classes OR five years post-doctoral reaearch works.

3. Lecturer(General)
Essential- (i) Consistently good academic record with atleast high 11 Class Master's Degree in the relevant subject.

(ii) A doctorate degree OR research work of an equivalent high standard.

4. Lecturer(M.I.L.)
Essential- (i) Consistently good academic record with high 11 Class Master's Degree in the Language concerned ; and

(ii) A doctorate degree in any subject or research work of an equally high standard ;

OR

(iii) Consistently good academic record with a high 11 Class Master's Degree in any subject and atleast 60% marks in the language concerned and Degree/Honours examination ; and

(iv) A doctorate degree in any subject or published literary work of a standard equivalent to Ph.D. degree in the concerned language with active interest in literary pursuits as evidenced by published work.

5. Lecturer in Law :
Essential - (i) Consistently good academic record with atleast high second class Master's Degree in Law (LL.M.) Provided that these qualifications will not be applicable in case of practising Lawyers appointed as Part-time Lecturers.

Explanation- Consistently good academic record means, a candidate must have obtained atleast mid-point of First and Second Division marks in aggregate at the Degree/Honours and Master's Degree level.

March, 1985.

Annexure - B

NORTH-EASTERN HILL UNIVERSITY
SHILLONG - 793 001

Draft Revised Regulations on qualification of University teachers

1. The following shall be the qualifications of University teachers consequent upon the revision of Scale of pay in accordance with the 4th pay Commission :-

2 Professors :-

An eminent scholar with published work of high quality actively engaged in research with 10 years of experience in P.G teaching and / or research at the University/National level Institutions, including experience or guiding research at Doctorate level.

Or

An outstanding scholar with established reputation who has made significant contribution to knowledge.

3(A)-Reader (Open Selection)

(i) Good academic record with doctoral degree or equivalent published work. Candidates from outside the University system in addition shall also possess at least 55% mark or an equivalent grade at the Master's degree level and

(ii) Eight years experience of teaching and/or research including upto 3 years for research degrees and has made some Mark in the areas of scholarship as evidenced by quality of publications contributions to educational innovation, design of new courses and curricula.

3(B)-Reader (Promotion)

Every lecturer in the senior Scale of Rs. 3000-5000 will be considered for promotion to the post of Reader in the scale of Rs.3700-5700 if he/she fulfils the following requirements :-

(i) Completed 8 years of service in the Senior Scale provided that the requirement of 8 years will be relaxed if the total service of the lecturer is not less than 16 years as on 1.1.86 or thereafter.

(ii) Obtained a Ph.D Degree, or an equivalent published work.

(iii) Made some mark in the areas of scholarship and research as evidenced by self-assessment, reports of referees, quality of publications, contribution to educational renovation, design of new courses and curricula.

contd/...../

(iv) Participated in two refresher courses/summer institute of approved duration, or engaged in other appropriate continuing education programmes of comparable quality as may be specified by the UGC after placement in the Senior Scale, and

(v) Consistently good performance appraisal reports.

3(C)- Lecturer (Selection Grade)

Lecturers in the Senior Scale who do not have a Ph.D degree or equivalent published work and who do not meet the scholarship and research standards, but fulfil the other criteria prescribed in 3(b) above for promotion to the post of Reader, will be considered for placement in the Selection grade provided they have a good record in teaching and/or participation in extension activities. They could offer themselves for fresh assessment after obtaining Ph.D degree and after fulfilling other requirements for promotion as Readers, and if found suitable, could be given the designation of Reader.

3(d) Lecturer(Senior Scale)

Every lecturer will be considered for placement in the Senior Scale of Rs. 3000-5000 if he/she fulfils the following requirements:-
(i) Completed 8 years of service after regular appointment provided that the requirement of 8 years service will be relaxed by 3 years and 1 year respectively, if the lecturer holds a Ph.D or M.Phil degree.
(ii) Participated in two refresher courses/summer institutes, of approved duration or engaged in other appropriate continuing education programmes of comparable quality as may be specified by the UGC and
(iii) Consistently satisfactory performance appraisal reports.

Provided that promotion to the post of Reader and placement in the Selection Grade and in the Senior Scale will be considered through a procedure of screening and on the recommendation of the Selection Committee constituted by the Executive Council.

4. Lecturer

A-Art, Sciences, Social Sciences, Commerce, Education, Physical Education, Foreign Languages and Law.

(i) Good academic record with at least 55% marks or an equivalent grade at Master's degree level in the relevant subject from an Indian University or an equivalent degree from a foreign University and
(ii) Clearance of the eligibility test conducted by the UGC, CSIR or similar test accredited by the UGC.

B- Journalism and Mass Communication

(i) Good academic record with at least 55% marks or an equivalent grade at Master's degree level in the relevent subject from an Indian University or an equivalent degree from a foreign University and
(ii) Clearance in the eligibility test conducted by the UGC, CSIR or similar test accredited by the UGC.

Or,

Contd/---.../-

(i) At least 55% marks or an equivalent grade at Master's degree level in Social Sciences/Sciences/ Humanities with at least Second Class Bachalor's degree or Post Graduate diploma in communication/Mass Communication or Journalism from a Recognised Indian University/ National Institute and

(ii) Clearance of the eligibility test conducted by the UGC,CSIR or similar test accredited by the UGC.

* Provided that the requirement of clearance of the eligibility test prescribed at 4A (ii) 4 B (ii) above will be relaxed in respect of candidates who besides fulfilling the requirement at 4 A (i) or 4 B (i),-

have passed the UGC/CSIR JRF examination

or

possessed an M.Phil degree awarded within December 1990

or

possessed a Ph.D degree awarded within December 1992.

* Explanation note : The provision of relaxation allowed to candidates who possess an M.Phil degree awarded within December, 1990 or a Ph.D degree awarded within December, 1992 will not be applicable in respect of candidates who were awarded an M.Phil degree or a Ph.D degree after December, 1990 or December, 1992 respectively.

5:2:1:(1)

5:2 - Syllabus etc.

(i) Revision of syllabus for M.Sc in Bio-Chemistry.

The Revised syllabus for M.Sc(Bio-Chemistry) was considered and approved at the School Board of Life Sciences meeting held on 10.6.92.

The Revised syllabus is placed at Annexure-'A' for consideration of the Council.

Course Structure
M.Sc Biochemistry Programme
North-Eastern Hill University

Course No.	Course Title	Max Marks
1st Semester		
BC 101	Chemistry	100
BC 102	Introductory Biochemistry & Biostatistics	100
BC 103	Enzymology	100
BCP 101	Practicals	150
IInd Semester		
BC 204	Techniques in Biochemistry	100
BC 205	Physiological Chemistry	100
BC 206	Bioenergetic Pathways	100
BCP 202	Practicals	150
IIIrd Semester		
BC 307	Genetics	100
BC 308	Medical Biochemistry	100
BC 309	Biosynthetic Pathways	100
BCP 303	Practicals	150
IVth Semester		
BC 410	Molecular Biology	100
BC 411	Microbiology & Immunology	100
BC 412	Special Papers	100
BC 404	Practicals	150

BC 101 Chemistry MM 100

Unit 1. Atomic orbitals & hybridisation: chirality, op-tical and stereoi. omerism. RS designation.

Unit 2. Substitution reactions (SN^1 SN^2 & SN^i): elimination, addition, and condensation reactions (including hydrolysis): carbonium ions, carbenes and free radicals :

Unit 3. Laws of thermodynamics: work function, free energy and equilibrium constant; proton transfer and oxidation-reduction r. c.. reactions, standard electrode potential, electron transfer potential, coupled reactions and simultaneous equilibria.

Unit 4. Brief introduction to collective properties of solution, osmotic pressure and its application in the measurement of molecular weight. Clasius-Claperon equation. Donnan membrane equilibria, ion transport. Introduction to surface tension, viscosity, dielectric constant, dipole moment, refractive index and molar refraction.

Unit 5. Acid-base concept, mono-, di- and polyprotic acids, buffer solution and their action, concept of pH and indicators: Boltzmann's distribution law, degree of freedom and motion, principle of equipartition of energy, diffusion and its molecular interpretation based on kinetic theory.

Suggested Readings:

*H.Dugas & C.Permey (1981).Bioorganic Chemistry, Springer-Verlaag.
*I.L.Finar (1974). Organic Chemistry.Vol.I & II.ELBS
*R.T.Morrison & R.N.Boyd(1989).Organic Chemistry, Allyn & Baton.
*K.E. von Holde (1985). Physical Biochemistry,Prantice-Hall
*P.W.Atkins (1986).Physical Chemistry, W.H.Freeman.
*F.A.Carey (1987). Organic Chemistry, Mc Graw-Hill.
*R.Chang (1981).Physical Chemistry with application to biological systems. Macmillan Publ.
*B.H.Mahan (1986). University Chemistry, Addition Wesley.

BC 102 Introductory Biochemistry & Biostatistics MM 100

A: Introductory Biochemistry MM 50

Unit I. General properties and configuration of amino acids, essential & nonessential amino acids, mode of peptide bond formation, naturally occurring peptides, biological importance of amino acids, peptides and proteins: primary, secondary, tertiary and quaternary structure of proteins.

Unit 2. Classification, structure, chemistry and biological significance of carbohydrates and lipids.

Unit 3. Structure and properties of nucleic acids: elucidation of structure of nucleic acids by enzymic and chemical methods; nucleic acids as genetic material: isolation and purification of nucleic acids.

B: Biostatics MM 50

Unit 1. General introduction, design of experiment in biochemistry, significance of statistical methods in biological investigations, sampling techhiques.

Unit 2. Theory of estimation, exact sampling distributions, t, χ^2. F: analysis of variance and covariance.

Unit 3. Statistical evaluation of results (collection, tabulation, diagramatic and graphical presentation of data); probability theory, frequency distribution and measurement of central tendency (mean, median, mode), measurement of dispersion (standard deviation, variance), skewness and kurtosis random variance and distribution function (binomial, Poission, normal distributions), correlation and regression.

Suggested Readings:

*L.Stryer (1988). Biochemistry, W.H.Freeman.
*A.L.Lehninger (1976). Biochemistry, Worth Publishers.
*G.Zubay (1988), Biochemistry, Macmillan.
*E.S.West et al. (1974), Textbook of Biochemistry, Oxford & IBH Publ. Co.
*R.C.Campbell (1974). Statistics for biologists, Cambridge University Press.
*S.C. Gupta & V.K.Kapoor (1989) Vital Statistics, Chand & Co.
*R.D.Remington & M.A.Schork (1985). Statistics with applications to the biological and health sciences, Prentice Hall.

BC 103 Enzymology MM 100

Unit 1. Definition, isolation and purification of enzymes, criteria of purity, specific activity, active site and enzymic catalysis; factors affecting the rate of enzyme catalysis; factors involved in enzyme-substrate complex formation: enzyme denaturation; enzyme classification.

Unit 2. Michaelis-Menten kinetics, determination and significance of K_m and V_{max}; competitive, noncompetitive and uncompetitive inhibitions, kinetics of bisubstrate reactions.

Unit 3. Structure, function and importance of coenzyme A, NAD^+, $NADP^+$, FMN, FAD^+, TPP, lipoic acid, pyridoxal phosphate, biotin, folic acid and cobalamine.

Unit 4. Features and mechanisms of the action of chymotrypsin, lysozyme and carboxypeptidase A: Regulation of enzyme activity: induction, repression and covalent modification.

Unit 5. Concerted and sequential models for allosterism and its significance; zymogen forms of enzymes, mechanism of zymogen activation and physiological significance of zymogenicity; definition, distribution, regulation and significance of isozymes.

Suggested Readings:

* A.L.Lehninger (1976). Biochemistry, Worth Publ.
*G.Zubay (1988). Biochemistry, Macmillan
*M.Dixon & E.C.Webb(1979).Enzymes, Longman
*L.Stryer (1988). Biochemistry, W.H.Freeman.
*A.Fersht (1985). Enzyme structure and mechanism W.H.Freeman

BCP 101 Practicals MM 150

1. Denaturation of proteins
2. Verification of Beer-Lambert's Law.
3. Preparation of buffer using Handerson-Hasselbach equation and determination of its buffering capacity by acid & alkali.
4. Isolation and estimation of casein from milk.
5. Isolation and estimation of glycogen from liver.
6. Isolation and estimation of starch from potato.
7. Estimation of protein by biurate.Lowry's and Bradford's methods.
8. Colour reactions of amino acids.
9. Formal titration of aminoacids.
10. Analysis of a mixture of carbohydrates by their colour reactions.
11. Quantitative estimation of sugars by anthrone method.
12. Estimation of DNA using diphenylamine.
13. Estimation of RNA using orcinol
14. Determination of iodine number of lipids.
15. Determination of K_m & V_{max} of an enzyme and statistical analysis of the data.
16. Representation of different statistical data.
17. Measurement of central tendency and dispersion.
18. Correlation of statistical data.
19. Estimation of significance using t.X^2 and F tests.

Suggested Readings:

*I.H. Segal (1976).Biochemical calculations. John Wiley.

*D.T. Plumer(1978).An introduction to practicals in biochemistry Tata Mc Graw-Hill.

*J.M. Clark & R.L. Switzer(1977).Esperimental Biochemistry W.H. Freeman.

*T.G. Cooper (1977). The tools of biochemistry , John Wiley.

*J. Jayaraman(1981).Practicals in biochemistry. Wiley Estern.

BC 204 Techniques in Biochemistry MM 100

Unit 1. Principles and applications of adsorption, paper, thin layer, gas liquid, ion exchange, molecular sieve(gel filtration), and high performance liquid chromatography; chromatofocussing; affinity chromatography; different electrophoretic methods: isoelectrofocussing.

Unit 2. Transmission and scanning electron microscopy,immunogold labelling and EDAX: principles and applications of equilibrium dialysis; ultrafiltration; freeze drying; protein sequencing and amino acid analysis.

Unit 3. Spectrophotometry, spectrofluorometry, ultracentrifugation, membrane electrodes and their applications, polarography, refractrometry, viscometry.

Unit 4. Introduction to radiations, their use in biology, and safety measures; LSC, γ-counting,and autoradiography; mass spectrometry.

Unit 5. Principles and biological applications of NMR, Raman, ESR, neutron diffraction, EXAFS, X-ray crystalography.

Suggested Readings :

*S.B. Needleman(1975). Protein sequence determination Springer-Verlag.

*M.A. Hayat(1986). Basic techniques for TEM. Academic Press.

*J.M. Walker & W.Gyastra(1983).Techniques in biochemistry & molecular biology. Macmillan.

*Y. Kobayshi & D.V. Mandsley(1974). Biological application of LSC. Academic Press.

BC 205 Physiological Chemistry MM 100

Unit 1. Chemistry and function of digestive juices:different components of body fluids; regulation of water and electrolyte balance, and role of kidney and hormones in its maintenance; Acid-base balance: role of body buffers.

Unit 2. Structure and chemical nature of biomembranes, ion channels and ionophores, movement of water and solutes, membrane transport.

Unit 3. Excitable membranes and nerve conduction: chemical regulation of synapses: neurotransmitters:muscle proteins, microfilaments and microtubules: muscle contraction, cell motility, biochemistry of vision.

Unit 4. Extrinsic and intrinsic pathways of blood coagulation, mechanism of blood coagulation, coagulation abnormalities: plasma proteins and their function:blood groups,chemistry of respiration.

Unit 5. Biosynthesis, chemistry and biological action of endocrine hormones : mechanism of action of steriod and peptide hormones chemistry and action of prostaglandins.

Suggested Readings :

*A.C. Guyton(1987).Human physiology and mechanism of diseases. W.B. Saunders & Co.

*A.J. Vander et al (1985). Human physiology: the mechanism of body function. Mc Graw-Hill.

*R.K. Murray & D.K. Garanneth (1988). Harper's review of biochemistry. Lange Med. Publ.

*A.W. Norman & G.Litwack(1987). Hormones. Academic Press.

*W.F. Ganong (1985)Review of medical physiology, Longe, Med. Publ.

*L. Stryer (1988). Biochemistry, W.H. Freeman.

*J.D. Rawn(1989), Biochemistry, North Carolina Biol.Supply Co.

*A.L. Lehninger (1984).Principles of biochemistry, Worth Publ.

BC 206 Bioenergetic Pathways MM 100

Unit 1. Introduction, high energy compounds, glycogenolysis, glycolysis, TCA cycle.

Unit 2. Catabolic pathways leading to TCA cycle, amino acid catabolism, oxidative pentose phosphate pathway.

Unit 3. Mobilization of fats, hydrolysis of triacylglycerides. oxidation of fatty acids:glyoxylate cycle and gluconeogenesis.

Unit 4. Respiratory and photosynthetic electron transport chains. Mitchell hypothesis (chemiosmotic theory).

Unit 5. ATP synthetase and mechanism of ATP synthesis, inhibitors and uncouplers bacteriorhodopsin.

Suggested Readings :

*D.G. Nicholls (1982).Bioenergetics(an introduction to chemiosmotic theory), Academic Press.

*G. Zubay (1988), Biochemistry, Macmillan.

*L.Stryer (1988), Biochemistry, W.H.Freeman.

BCP 202 Practicals MM 150

1. Distribution of iodine between water and carbon tetrachloride.
2. Kinetics of decomposition of hydrogen peroxide in the presence of $FeCl_3$ as catalyst.
3. Kinetics of hydrolysis of sugar, using polarimeter.
4. Assay of amylase activity from human saliva.
5. Paper chromatography of sugars and amino acids.
6. Estimation of cysteine from hair.
7. PAGE and SDS-PAGE.
8. Estimation of carbohydrate by Nelson's method.
9. Estimation of inorganic phosphate.
10. Measurement of Photosynthesis by oxygen evolution and effects of inhibitors/uncouplers.
11. Measurement of respiration by oxygen consumption and effects of inhibitors/uncouplers.
12. Scintillation counting, quenching and calculation of ^{32}P.
13. Cultivation and measurement of growth of Nostoc and Anabaena.
14. Seperation of proteins by gel filtration.
15. Estimation of blood hemoglobin, and blood groupimg.

Suggested Readings :

*As in BCP 101

BC 307 Genetics MM 100

Unit 1. Organization of genetic material in viruses, prokaryotes, eukaryotes and organelles.

Unit 2. Replication of genetic material in viruses, prokaryotes eukaryotes and organelles(details of the enzymology, modes, topology and membrane association, replisome).

Unit 3. Concept of gene, fine structure of gene, units of recombination, mutation and function, inter- and intracistronic complementation.

Unit 4. Transmission of genetic material in sexual and parasexual systems, conjugation transformation, transduction linkage of genes.

Unit 5. Mutation, mutagenic agents, molecular basis of mutation consequences of mutation; genetic repair mechanisms.

Suggested Readings :

*J.M. Walker & E.B. Gingold (1988), Molecular biology and biotechnology, Royal Soc. Chemistry.

*D. Grierson & S. Covey (1988). Plant molecular biology, Blackie.

*C.H. Shaw (1988). Plant molecular biology: a practical approach, IRL Press.

*E.A. Birge (1981). Bacterial and bacteriophage genetics, Springer-Veriag.

*D. Friefelder (1987). Microbial genetics, Jones & Bartlett Publ.

*D.Friefelder (1987).Molecular biology, Jones & Bartlett Publ.

*P. Parve et al (1987). Basic biotechnology: a student guide, VCH.

*J.D. Watson et al (1987). Molecular biology of gene, Benjamin.

*S.B. Peimrose (1987). Modern biotechnology, Blackwell.

*I.H. Herskowitz (1969). Basic principles of molecular genetics, Nelson.

5:2.1:(10)

BC 308 Medical Biochemistry MM 100

C [illegible]

Unit 1. Diseases caused by abnormalities in the liver (fatty liver, jaundice, hepatitis, cirrhosis, liver function test), kidney (nephrotic syndrome, glomerulonephritis, renal failure and amyloidosis, kidney function test), bone (mineralization and demineralization, rickets, Paget's disease), ocular tissue (cataract and night blindness).

Unit 2. Enzymes used in clinical diagnosis and prognosis; biochemistry of anemia and abnormal hemoglobin, thalassemia, porphyria, atherosclerosis, Wilson's disease, Tay Sach's disease, Kwashoirkor.

Unit 3. Diseases caused by metabolic disorders of endocrine glands: obesity, Addison's disease, Conn's syndrome, Cushing's syndrome, hypo- and hyperthyroidism : gastrointestinal disorders: Down's and Turner syndromes, Parkinsons's disease, Alzheimer's disease.

Unit 4. Allergy and hypersesitivity, autoimmunity, autoimmune diseases and syndromes, major histocompatibility complex and tissue transplantation; Vaccines.

Unit 5. Biochemical basis of drug action and detoxification mechanisms, drug resistance, sensitivity, and addiction; biochemical features of cancer cells, theories of chemical car inogenesis, oncogenic viruses.

Suggested Readings:

*D.M.Goldberg(Yearly series). Annual Review of Clinical Biochemistry, Academic Press.

*L.Stryer (1988).Biochemistry, W.H.Freeman.

*T.M.Delvin(1986). Textbook of biochemistry with clinical correlation,John Wiley.

*W.F.Ganong (1985). Review of medical physiology, Lange Medical Publ.

*W.O.Foyy (1981). Principles of medicinal chemistry, Lea & Febinger publ.

*J.Cairns (1978). Cancer. Science & Society, W.H.Freeman

*I.M.Roitt et al. (1988). Immunology, Mosby & Gower Publ.

*H.E.Spiegel (1981). Clinical biochemistry, Academic press.

BC 309 Biosynthetic Pathways MM 100

Unit 1. Biosynthesis

Unit 1. Biosynthesis of disaccharides, starch, glycogen and cellulose:sugars & sugar derivatives of bacterial cell walls: interconversion of sugars.

Unit 2. Biosynthesis of fatty acids and its regulation, triacylglycerides and cholesterol.

Unit 3. Biosynthesis of aminoacids and its regulation.

Unit.4. Urea cycle:; biosynthesis of porphyrins and its regulation; nitrogen metabolism, nitrogen fixation and sulphate reduction in plants.

Unit 5. Biosynthesis of nucleotides and its regulation; inborn errors of metabolism.

Suggested readings:

*G.Zubay (1988). Biochemistry, Macmillan Publ.
*L.Stryer (1988). Biochemistry, W.H.Freeman
*J.D.Rawn (1989). Biochemistry, North Carolina Biol.Supply Co.

BCP 303 Practicals MM 150

1. Estimation of sugar in urine and blood
2. Estimation of blood cholesterol
3. Estimation of blood urea
4. Estimation of blood calcium
5. Determination of melting point and AT/GC ratio of DNA
6. Assay of enzymes of clinical significance such as SGOT and SGPT.
7. Assay of alkaline phosphatase activity
8. Determination of rate of DNA synthesis.
9. Observation of chromosomes during cell division
10. Irradiation of cells with UV and measurement of photorepair by studying cell survival.
11. Measurement of unscheduled DNA synthesis.
12. Mutant isolation using mutagens.

Suggested Readings:

*As in BCP 101

BC 410 Molecular Biology MM 100

Unit 1. Historical perspective and information transfer in biological systems. RNA (mRNA, tRNA, rRNA) tertiary and quaternary structures; transcription (RNA plymerase, σ and ρ factors recognition, binding, initiation sites, initiation, direction, elongation and termination); sense strand; transcription in eukaryotes; post-transcriptional processing (hnRNA, maturation of mRNA, introns and exons, RNA splicing).

Unit 2. Colinearity of genes and proteins, genetic code (evidences of triple nucleotide codons, wobble hypothesis, degeneracy of codons, nonsense codons); translation (involvement of ribosomes and ribosomal proteins, aminoacyl tRNA; initiation; elongation and termination - roles of various factors); translation in eukaryotes; post-translational processing.

Unit 3. Regulation - concept of biological economy, regulation of gene expression; Operon (inducible and repressible operons, lysogeny and lytic phase switching in λ virus); heterologous gene expression, regulation at translational level; regulation of gene expression in eukaryotes.

Unit 4. Gene cloning - general strategy, restriction endonucleases (mode of action, restriction modification); vectors (plasmid, λ DNA, cosmid, expression vector); selection.

Unit 5. Restriction analysis (shot gun approach, gene bank, chromosome walking, elucidation of fine structure of genes); transposons; genetic engineering in biotechnology (molecular probes and their applications, isolation of gene, genetic finger printing; medical, pharmaceutical and agricultural applications).

Suggested Readings:

*B.Lewin (1990). Gene IV. Oxford Cell Press.
*E.L.Winnaker (1987) From genes to clones, VCH.
*T.Maniatis et al (1984). Molecular cloning, CHS.
*Plus all the references mentioned in BC 307.

....

BC 411 Microbiology and Immunology MM 100

Unit 1. Outlines of microbiology, general features of structure and reproduction in fungi, bacteria and viruses; methods for isolation and cultivation of microbes, culture media, kinetics of growth, synchronous and continuous cultures, and their uses.

Unit 2. Isolation and analysis of mutants and their uses; microbial assays for vitamins, amino acids, antibiotics and viruses.

Unit 3. Industrial microbes and their uses in production of food, drugs, hormones, single cell proteins, antibiotics and biofertilizers:microbes involved in infectious diseases and their control.

Unit 4. Cells and organs of immune system, clonal selection theory, innate and specific immunity, antigen processing and presentation to T cells, humoral and cell mediated immunity, antigen specific receptors on T & B lymphocytes, role of MHC genes and products in immune response, associated MHC functions, allograft, graft vs host, and mixed leukocyte responses.

Unit 5. Antibodies structure in relation to function and antigen binding, measurement of antigen-antibody interaction, agglutination, immunodiffussion, complement-fixation, immunoelectrophoresis, ELISA, RIA, immunoblotting; production of monoclonal antibodies, raising of antisera.

Suggested Readings:

*R.Y. Stanier et al (1990). The Microbial World, Prentice-Hall
*T.D.Brock et al (1984). Biology of microorganisms, Prentice-Hall Hall.
*J.F.Wilkinson (1987). Introductory microbiology, Blackwell.
*P.Parve et al (1987). Basic biotechnology: a students guide, VCH.
*I.M.Roitt et al (1988). Immunology, Mosby & Gower Publ.
*M.Z.Atassi etl al (1984). Molecular immunology, Marcel Dekker.
*G.P. Talwar (1983). A hanbood of practical immunology, Vikas Publ.

.....

B.C 412 A Protein Chemistry MM 100

Unit 1. Different levels of protein structure and their importance, assembly of fibrous proteins, concept of domain structure.
Unit 2. Native state of protein, brief outline of the methods used to study protein folding in vitro, protein stability and its measurement, role of long - medium- and short range interactions in protein folding, thermodynamics and kinetics of protein folding; nucleation hypothesis.

Unit 3. Determinants of protein folding with special reference to the roles of molecular chaperones, post-translational modifications and environment in the self assembly process; role of signal peptides in protein folding within the cells.
Unit 4. Methods of chemical modifications and the latter's effect on structure, properties and functions; uses of chemical modifications.
Unit 5. Protein engineering - art of designing new proteins, site-directed mutagenesis, problems of inclusion body formation and active protein recovery; thermostabilization of enzymes.

Suggested Readings :

*T.E.Creighton (1990). Protein structure: a practical approach, IRL Press.

*G.E.Schultz & R.H. Schirmer (1978). Principles of protein structure, Springer-Verlag.

*R.Jaenicke (1980). Protein folding, Elsevier.

*L.M. Gierasch & J.King (1990). Protein folding: deciphering the second half of the genetic code. AAAS Publ.

*D.L.Oxender & C.F.Fox (1987). Protein engineering, Allen R. Liss Publ.

*Series:Methods in Enzymology & Advances in Protein Chemistry

BC 412 B HORMONE BIOCHEMISTRY MM 100

Unit 1. General characteristics of hormones, types of hormones, hormones from endocrine, paracrine and autocrine glands, hormoneses in microbes and plants; feedback regulation of hormone synthesis; evolution of receptor concept for hormones, physical parameters of hormone receptor interactions; chemistry, biosynthesis, and biological action of hypothalamic and pituitary hormones; hormones and multigene family.

Unit 2. Chemistry, biosynthesis, and molecular action of hormones of thyroid and parathyroid, pancreas, gastrointestine, adrenal cortex and medulla, gonads; hormones of pregnancy and lactation.

Unit 3. Molecular mechanism of action of steroid hormones, structure and function of receptors, heat-shock proteins and steroid receptors; steroid receptors as DNA binding protein; role of Zn $^{++}$ fingers in receptor-DNA interaction and gene expression by hormones; role of hormone response elements (HRE) in receptor-DNA interaction; steroid receptors and supergene family.

Unit 4. Molecular mechanisms of action of peptide and protein h hormones; structure of cell surface receptors; role of G-pro - teins in signal transduction; regulation of G-protein action; regulation of adenylate and guanylate cyclases and production of cAMP and cGMP; cAMP and protein kinase A cascade; cGMP and protein kinase G cascade; Ca^{++}/phosphatidyl inositol/diacyl glycerol/protein kinase C cascade.

Unit 5. Chemistry, biosynthesis and action of cell growth factors: Growth factors and oncogene products; prostaglandins; interferons; hormones of heart, kidney, thymus and pineal glands; hormones as regulators of development and aging; biomodulators of hormone action.

Suggested Readings :

*A.W.Norman & G.Litwack (1987).Hormones, Academic Press.

*W.F.Ganong (1985). Review of medical physiology, Lange Med.Publ

*J.Domell et al (1990). Molecular cell biology,Scientific American books.

*L.Stryer (1988). Biochemistry, W.H.Freeman
*A.J.Vander et al (1985). Human physiology: the mechan[illegible] of body function. McGraw-Hill.
*R.K.Murray & D.K. Garannet[illegible] (1988). Harper's review of biochemistry. Lange Med.Publ.

....

BC 412 C Biological Nitrogen Fixation of MM 100

Unit 1. Diazotrophy: range of diazotrophy:bacteria,cyanobacteria, actinomycetes; diazotrophy & eukaryotes; diazotrophic symbioses: bacterial, cyanobacterial, actinorhizal.

Unit 2. Nitrogenase enzyme complex: requirements for nitrogenase function; mechanism of nitrogenase action; regulation of nitrogenase: ammonium and nitrate transport and assimilation systems; oxygen sensitivity of nitrogenase and strategies for protection of nitrogenase from oxygen inactivation/damage.

Unit 3. Genetics of nitrogen fixation: the nif gene clustre, organization of nif genes, nif gene transfer.

Unit 4. Biochemistry & physiology of diazotrophic symbioses: interactions between N & C metabolism in symbionts, special regulatory features of nitrogenase in symbionts, diazotrophic symbioses and harnessing of solar energy.

Unit. 5 Nitrogen fixation and photosynthesis: nitrogen fixation and biotechnology of ammonia, hydrogen,and biofertilizer production: application of diazotrophs in farming.

Suggested Readings :

*A.N.Rai (1990).Handbook of symbiotic cyanobacteria, CRC Press.
*J.R.Gallon & A.E.Chaplin (1987). An introduction to nitrogen fixation. Cassell Educational.
*J.R.Postage (1982). The fundamentals of nitroge[illegible] fixation, Cambridge University Press.
*F.J.Bergersen (1980). Methods for evaluating biological nitrogen fixation, John Wiley.
*A.Hollander (1977). Genetic engineering for nitrogen fixation, Plenum Press.

.....

BC 412 D Molecular aspects of Radiation and Cancer MM 100

Unit 1. Manipulation of eukaryotic genome: general considerations; microinjection of genes, transgenic animals.

Unit 2. Cancer, cell culture, cell cycle, "normal" cell lines, cell transformation, factors regulating proliferation and differentiation (mechanism of action); cancer cells, DNA & RNA tumor viruses, molecular basis of chemical carcinogenesis, human cancer.

....

Unit 3. Oncogenes: characteristics and nature, mode of action and its role in cell division and development, detection (use of probes).

Unit 4. Radiation: DNA and radiation damage, radiation-induced gene expression, DNA repair genes, molecular basis of photodynamic therapy (PDT)., recombinant DNA technology in radiation-induced damage and repair.

Unit 5. Mutation: molecular mechanisms of mutation, genes involved in mutation, excision repair system, recombinant repair system.

Suggested Readings:

*E.L.Winnacker (1987). From genes to clones. VCH.

*M.Umeda et al (1987). Biotechnology of mammalian cells, Springer-Verlag.

*K.B.Burck et al (1988)..Oncogenes, Springer-Verlag.

*J.D.Watson et al (1987). Molecular biology of the gene, Banjamin/Cumming Publ.

*P.Kahn & T.Graf (1988). Oncogenes and growth control. Springer-Verlag.

....

BC 412 E Molecular Immunology MM 100

Unit 1. Granulocyte (Neutrophils, Eosinophils, Basophils) function and biomedical basis; the process of inflammation, its physiological basis and relevance; antibody structure: isotypes, allotypes, idiotypes, variability; immunoglobulin gene; genetic basis of creation of antibody diversity.

Unit2. Histocompatibility; structure of class I and II MHC antigens and their genes, tissue typing, HLA and disease association; molecular basis of complement activation; natural killer cells, mechanism of NK cell mediated cytotoxicity, cytotoxic factors.

Unit 3. T-cell CD markers and differentiation: T-cell receptor organization and signal transductions: T-cell activation; cell interaction and role of cytokines; antigen processing and presentation; MHC restriction for CD4 and CD8 subsets of T cells; B-cell differentiation; B-cell growth and differentiation factors; isotype regulation; B-Cell activation.

Unit 4. Isolation and characterization of immunoglobulin: technique of immunzation; monoclonal antibodies/myeloma and hybridoma.

Unit 5. Methodology of vaccine preparation: vaccine delivery system: immunomodulation; use of liposome as a carrier and as an immunoadjuvant in cancer chemotherapy.

Suggested Readings :

*I.M.Roitt et al(1988). Immunology, Mosby ' Gower Publ.

*M.Z. Atassi et al (1984). Molecular immunology, Marcel Dekker.

*L.A.Herzenberg & C.Blackwell (1986). Application of immunological methods in biomedical science. Blackwell Publ.

*G.P.Talwar (1983). A hanbook of practical immunology, Vikas Publ.

*G.Gregoriadis (1984). Liposome technology. CRC Press.

*W.R. Clark (1983). The experimental foundation of modern immunology, John Wiley.

....

BCP 404 Practicals MM 150

Part A MM 100

1. Agarose gel electrophoresis of DNA and recovery of DNA fragments by electoelution.
2. Separation of single and double strand DNA by hydroxyapatite column chromatography
3. Fractionation of cell organalles by ultracentrifugation.
4. Oxygen uptake by mitochondria to elucidate γ-radiation effect
5. Estimation of thiol groups in a protein.
6. Determination of tryptophan residues in protein
7. End group analysis of a protein
8. Microbial growth measurement.
9. Isolation of photosynthetic pigments of prokaryotes and eukaryotes.
10. Induction of β-galactosidase in E.coli
11. Immunodiffusion and immunoelectrophoresis.
12. Raising of antisera
13. Purification of BSA
14. Plasmid isolation from E.coli.

Part B MM 50.

Protein Chemistry :

1. Characterization of proteins: molecular wt.. amino acid composition, hydrodynamic properties (Stoke's radius and frictional ratio, sedimentation coefficient).
2. Chemical modification of proteins/mapping of active sites.
3. Fragmentation of proteins by chemical/enzymic methods.

Or

Hormone Biochemistry:

1. Measurement of hormone concentration using RIA.
2. Isolation and purification of intracellular and cell surface receptors.
3. Determination of receptor concentration by radioreceptor ass assay; caculation of Bmax, Kd & Ka. measurement of activation of receptor and its nuclei/DNA binding.

Or

Biological Nitrogen Fixation:

1. Isolation/cultivation of nitrogen-fixing cyanobacteria and cyanobacterial symbioses.
2. Measurement of nitrogenase activity and effect of combined nitrogen on nitrogenase activity in free-living and symbiotic systems.
3. Measurement of ammonium transport.

Or

Molecular Aspects of Rediation and Cancer

1. Isolation of plasmids from E.coli. fragmentation by endonucleases, and analysis of results.
2. Isolation of mammalian chromosome and elucidation of chromatin structure by enzymic method.
3. DNA synthesis activity following γ-irradiation.

Or

Molecular Immunology :

1. Raising of antisera against proteins and hormones
2. Quantitative analysis of antigen and antibodies by radial immunodiffusion, rocket immunoelectrophoresis and enzyme-linked immunosorbent assay.

X

(ii) Revised syllabus for M.Sc in Botany.

The revised syllabus for M.Sc in Botany was considered and approved by the School Board of Life Sciences in its meeting held on 10th,June'1992.

The revised syllabus is placed at Annexure -A for consideration of the Council.

3.2.2(2)

Annexure-A

DEPARTMENT OF BOTANY
NORTH-EASTERN HILL UNIVERSITY
SHILLONG
***

M.Sc. SYLLABUS
1991 - 1993

Admission Requirements :

For M.Sc. programme in Botany all candidates with B.Sc. Hons. degree (Three year) of North-Eastern Hill University or any other University considered equivalent by this University, with Botany as the main subject and Chemistry as one of the subsidiary subjects will be eligible to apply. Of the total 20 seats, 40% are reserved for scheduled tribes/caste students and 10% will be discretionary seats with the Vice-Chancellor.

Syllabus :

The M.Sc. (Botany) syllabus consists of 12 theory and their corresponding practical papers with 100 and 50 marks each, respectively. Teaching of the courses in Botany programme will be completed in four semesters during a period of two years as indicated in the following pages. Duration of examination for theory papers will be of 3 hours and for practicals 4 hours. In addition to the external evaluation, each student will also be assessed through internal assessment. Internal assessment will be equivalent to 25 marks for the theory paper and 12.5 marks for the practical paper.

5.12.2(3)

Internal Assessment Procedure

1. In each semester there shall be three internal assessments in each course both for theory and practical at monthly intervals.
2. Every student in addition to three internal assessments, has to give one seminar which will be equivalent to the one theory assessment i.e. 25 marks.
3. The course in which a student has to give seminar shall be allotted by the teacher concerned.
4. Each test will be evaluated through objectives or short note questions in theory. The practical assessment will be done during regular practical classes.
5. Internal assessment marks will be displayed on the notice board. The student may approach the respective teacher within three days after the notification if there is any discrepancy in the awards. Complaints about internal assessments awards will not be entertained subsequently.
6. In the end of semester, final grading is made by averaging the marks obtained in two best tests out of three and seminar marks secured by the student.
7. A student is expected to score a minimum of 35% marks in the internal assessment tests for each paper, failing which he/she shall not be allowed to appear in end semester examination of both theory and corresponding practical papers.

Attendance Requirement :

75% of the lectures, seminars, tutorials and practicals organised by the Department for a given course.

5:2:2 (4)

COURSE DISTRIBUTION

Semester I

B-101 Algae, Bryophyta and Pteridophyta (Theory)
B-102 Algae, Bryophyta and Pteridophyta (Practicals)
B-103 Gymnosperms and Plant Anatomy (Theory)
B-104 Gymnosperms and Plant Anatomy (Practicals)
B-105 Mycology and Plant Pathology (Theory)
B-106 Mycology and Plant Pathology (Practicals)

Semester II

B-201 Plant Taxonomy and Phytogeography (Theory)
B-202 Plant Taxonomy and Phytogeography (Practicals)
B-203 Microbiology (Theory)
B-204 Microbiology (Practicals)
B-205 Plant Biochemistry and Molecular Biology (Theory)
B-206 Plant Biochemistry and Molecular Biology (Practicals)

Semester III

B-301 Genetics and Plant Breeding (Theory)
B-302 Genetics and Plant Breeding (Practicals)
B-303 Population and Community Ecology (Theory)
B-304 Population and Community Ecology (Practicals)
B-305 Plant Physiology (Theory)
B-306 Plant Physiology (Practicals)

Semester IV

B-401 Morphology, Embryology and Differentiation (Theory)
B-402 Morphology, Embryology and Differentiation (Practicals)
B-403 Ecosystem Analysis and Biostatistics (Theory)
B-404 Ecosystem Analysis and Biostatistics (Practicals)
B-405 Special Paper (Theory)*
B-406 Special Paper (Practicals)*

*Special papers to be offered from amongst the followings :

(i) Microbial Ecology
(ii) Ecology and Management of Forest Ecosystem
(iii) Radiation Botany
(iv) Ecology and Physiology of Algae
(v) Protein Chemistry
(vi) Physiology of Plant Growth and Development
(vii) Applied Cell and Molecular Genetics
(viii) Angiospermic Taxonomy

*****

5.2.2(5)

B-101 Algae, Bryophyta and Pteridophyta
(Algae 50%, Bryophyta 25%, Pteridophyta 25%)
(Theory)

Unit I Algal classification and comparative account of range of structure, reproduction and life history; Ultrastructure of prokaryotic and eukaryotic algal cells; Pigments, food reserves and extra-cellular products.

Unit II Ecology and distribution of Indian freshwater and marine algae; Symbiotic algal associations; Nitrogen fixation and economic importance of algae.

Unit III Origin and classification of Bryophyta; Distribution and ecology of Bryophytes; A general account of the gametophyte, sporophyte, reproduction and affinities of Hepaticopsida, Anthocerotopsida and Bryopsida; Evolution of gametophyte and sporophyte in Bryophyta.

Unit IV Origin and classification of Pteridophytes; A comparative account of morphology, reproduction and affinities of Psilophytopsida, Psilotopsida; Lycopsida, Sphenopsida and Pteropsida.

Evolution of stele in Pteridophytes; Sorus evolution; Telome theory.

Suggested Readings :

Chapman, V.J. and Chapman, D.J. 1973. The Algae. McMillan, London.

Fritsch, F.E. 1935 and 1945. Structure and Reproduction of Algae. Vols. I & II. Cambridge Univ. Press.

Kumar, H.D. 1985. Algal Cell Biology. Affiliated East-West Press, New Delhi.

Lee, R.F. 1980. Phycology. Cambridge University Press.

Round, F.E. 1965. The Biology of Algae. Edward Arnold, London.

Trainer, F.R. 1978. Introductory Phycology. John Wiley & Sons., New York.

Parihar, N.S. 1965. An Introduction to Embryophyta. Vol.I. Bryophyta. Central Book Depot., Allahabad.

Schofield, W.B. 1985. Introduction to Bryology. McMillan.

Smith, G.M. 1955. Cryptogamic Botany. Vol.II : Bryophytes and Pteridophytes (2nd ed.). McGraw Hill, New York.

Watson, E.V. 1971. The Structure and Life of Bryophytes. Hutchinson Univ. Library, London.

Bierhorst, D.W. 1971. Morphology of Vascular Plants. MacMillan Co., London.

5.2.2(6)

Sporne, K.R. 1970. The Morphology of Pteridophytes. Hutchinson & Co., London.

Parihar, N.S. 1976. Biology and Morphology of Pteridophytes. Central Book Depot., Allahabad.

Smith, G.M. 1955. Cryptogamic Botany, Vol. II. Bryophyta and Pteridophyta. McGraw Hill Book Co.

James, A.J. 1936. Morphology of Vascular Plants - Lower Groups. McGraw Hill Book Co., New York.

Additional Readings :

Carr, N.G. and Whitton, B.A. (eds) 1982. The Biology of Cyanobacteria. Blackwell Scientific Publishers, Oxford.

Desikachary, T.V. 1959. Cyanophyta. ICAR, New Delhi.

Fay, P. 1983. The Blue-Greens. Edward Arnold, London.

Round, F.E. 1981. The Ecology of Algae. Cambridge University Press.

Smith, G.M. (ed.) 1957. Manual of Phycology. Chronica Botanica Co., Mass.

Stewart, W.D.P. (ed.) 1974. Algal Physiology and Biochemistry. Blackwell, Oxford.

Clarke, C.G.S. & Duckett J.G. 1979. Bryophyte Systematics. Academic Press, London.

Richardson D.H.S. 1971. The Biology of Mosses. John Wiley, New York.

Schuster, R.M. (ed.). 1983-84. New Manual of Bryology. Hattori Bot. Lab., Nichinan, Japan.

Verdoorn, F. (ed.). 1932. Manual of Bryology. Martinus Nijhoff, Hague.

5:9:2(7)

B-102 Algae, Bryophyta and Pteridophyta
(Practicals)

1. Collection, identification and study of morphological and reproductive features of common Indian fresh water and marine algae.

2. Study of morphology and anatomy of gametophyte and sporophyte of locally available representatives of Hepaticopsida, Anthocerotopsida and Bryopsida.

3. Study of morphology, anatomy and reproductive features of locally available forms belonging to various groups of Pteridophytes.

4. Study of some extinct Pteridophytes with the help of fossil specimens/slides.

5:2:2(8)

B-103 Gymnosperms and Plant Anatomy
(Gymnosperms 50%, Plant Anatomy 50%)
(Theory)

Unit I Basic principles of Palaeobotany; How plants become fossils?. Techniques for studying fossil plants; Fossil flora of India; A general account of morphology, reproduction and affinities of Pteridospermales, Bennettitales, Pentoxylales, Cordaitales and Progymnosperms.

Unit II Classification of gymnosperms : A comparative account of morphology, reproduction and affinities of Cycadales, Coniferales, Taxales and Gnetales.

Unit III A general account of tissues and tissue system; Meristems : apical, intercalary and lateral; Organization and histogenesis in root and shoot apical meristems, factor influencing the activity of apical meristems, leaf structure and development.

Unit IV Procambium and cambium, cambial derivatives and factors influencing cambial activity; A general account of secondary growth (normal and abnormal) wood-its formation, types and identifications; Xylogenesis and evolution of xylem; A general account of secretory structures; Transfer cells.

Suggested Readings :

Sporne, K.R. 1965. The Morphology of Gymnosperms, Hutchinson & Co., London.

Trivedi, B.S. & Singh, D.K. 1965. Structure and Reproduction of the Gymnosperms. Shashidhar Malaviya Prakashan, Lucknow.

Chamberlain, C.J. 1934. Gymnosperms, Structure and Evolution. Univ. of Chicago Press, Chicago.

Andrews, H.N. 1961. Studies in Palaeobotany. John Wiley & Sons, New York.

Arnold, C.A. 1947. An Introduction to Palaeobotany, McGraw Hill Book Co., New York.

Cutter, E.G. 1971. Plant Anatomy : Experiment & Interpretation. Vols. 1 & 2. Edward Arnold, London.

Fahn, A. 1974. Plant Anatomy, Pergamon Press, New York.

Esau, K. 1972. Plant Anatomy, John Wiley & Sons, Inc. New York.

Metcalfe, C.R. & Chalk, L. 1950. Anatomy of Dicotyledons, Clarendon Press, Oxford.

_____ 1971. Anatomy of Monocotyledons. Clarendon Press, Oxford.

Haberlandt, G. 1965. Physiological Plant Anatomy. Today & Tomorrow Printer & Publ., New Delhi.

5:2:2(9)

Esau, K. 1965. Vascular Differentiation in Plants. Holt. Rinehart & Sinston, New York.

Philipson, W.R., Ward, J.M. & Butterfield, B.P. 1971. The Vascular Cambium. Chapman & Hall LH, London.

Clowes, F.A.L. 1961. Apical Meristems. Blackwell Scientific Publishers, Oxford.

Johansen, D.A. 1940. Plant Microtechnique. McGraw Hill Book Co., New York.

B-104 Gymnosperms and Plant Anatomy

(Practicals)

1. Morphological and anatomical studies of vegetative and reproductive organs of Cryptomeria, Cedrus, Cupressus, Gnetum, Ginkgo, Agathis, Araucaria, Taxus, Juniperus.

2. Study of the following fossils.
Slides/specimens : Stem of Lyginopteris oldhamia, Kaloxylon hookeri, Rachiopteris aspera, Medullosa stem & Cordaitales stem & Carnoconites.

3. Study of shoot and root apical meristems.

4. Study of the effects of physical and chemical agents on organization of meristems.

5. Development of leaf and axillary buds.

6. Anomolous secondary growth.

7. Microdissection.

5:2:2(90)

B-105 Mycology and Plant Pathology
(Mycology 50%, Plant Pathology 50%)
(Theory)

Unit I Recent trends and criteria used in the classification of fungi with reference to vegetative and reproductive structures; A systematic study of the structure, development, reproduction, life cycle, Phylogeny and affinities of the main groups.

Unit II A general account of nutrition, sexuality and economic importance of fungi; Ecology of fungi : soil mycoflora, rhizosphere mycoflora, leaf surface mycoflora and air mycoflora; Role of fungi in industries with reference to production of alcohol, organic acids, antibiotics, food and fodder, yeast, mushroom cultivation, mycorrhizal application in forestry, agriculture and plant growth.

Unit III Symptomology and identification of diseases with reference to fungal, bacterial and viral infections; Interrelationships of parasitism and pathogenicity; Defence mechanism; Law of host parasite balance.

Unit IV Effect of environment on different classes of parasitism; Host genetics in relation to type of pathogenicity; Principles of plant disease control : physical chemical, biological, resistant variety, plant quarantine and crop rotation.

Suggested Readings :

Alexopolus, C.J. and C.W. Mirus, 1983. Introductory Mycology. Wiley Eastern Ltd., New Delhi.

Subramaniam, C.V. 1983. Hyphomycetes : Taxonomy and Biology. Academic Press, London.

Garraway, M.O. 1984. Fungal Nutrition and Physiology. Panima Education Agency, New Delhi.

Book, R.J. & Baker, K.F. 1983. The Nature and Practice of Biological Control of Plant Pathogens. A.P.S. Books 3340, Pilot Khob Road, St. Paul, Mn 55121, USA.

Bos, L. 1983. Introduction to Plant Virology. Wageningen Centre for Agricultural Publishing and Documentation.

New, Y.L. and Thapliyal, P.N. 1984. Fungicides in Plant Disease Control. Oxford and IBH Publishing Co., New Delhi.

5.2.2 (11)

Ingram, D.[illegible] and Williams, P.H. 1982. Advance in Plant Pathology. Academic Press, London.

Fry, W.E. 1982. Principles of Plant Disease Management. Academic Press, London.

Additional Readings :

Arr. J.A.V. 1981. Genera of Fungi Sporulating in Pure Culture. J. Cramer.

Mace, M.E. 1984. Fungal Wilt Diseases in Plants. Panima Education Agency, New Delhi.

B-106 Mycology and Plant Pathology
(Practicals)

1. Collection and identification of certain saprophytic and parasitic fungi of local importance.
2. Study of mycorrhizal association.
3. Preparation of media, cultivation of fungi and study of their morphology.
4. Identification of causal organisms from the diseased plant materials.
5. Study of morphology of some phytopathogens and antibiotics producing fungi.
6. Laboratory screening of fungicides (systemic and non-systemic) against pathogenic fungi.
7. Demonstration of antagonistic activity between pathogenic isolates and test organisms.

5.2.2(12)

B-201 Plant Taxonomy & Phytogeography
(Plant Taxonomy 75%, Phytogeography 25%)
Theory

Unit I Plant systematics; Plant taxonomy and their significance; Historical background of classification and system of plant classification; History of taxonomic researches in India; B.S.I. its establishment and activities; Important Indian and world taxonomic literature.

Unit II Herbarium and its significance; Herbarium and field methods; Plant nomenclature : polynomials and binomial system I.C.B.N., broad outline of the code, ranks and nomenclature of taxa, type methods and typification, type and population concept, priority, effective and valid publication, citations, nomenclature definations.

Unit III Origin of Angiosperms : Time of origin, probable ancestors and place of origin; Sources of taxonomic evidence : Cytology and genetics, chemistry, anatomy, embryology, palynology, ecology; Study of some biologically and economically important families of N.E. India.

Unit IV Phytogeography : Vegetation types of India; Floristic regions of India; Factors affecting distribution : climatic, edaphic and geographic; Endimism; Migration and barriers with special reference to Indian subcontinent.

Suggested Readings :

Puri, G.S., V.M. Meher-Homji, B.K. Gupta and S. Puri, 1983. Forest Ecology Vol.I. Phytogeography and Forest Conservation.

Jones, S.B. & A.E. Luchringer, 1979. Plant Systematics.

Jain, S.K. & R.R. Rao, 1977. A Hand Book of Field and Herbarium Methods.

Henry, A.N. & M. Chandrabose, 1979. An Aid to International Code of Botanical Nomenclature.

Nair, P.K.K. (ed.) 1980. Modern Trends in Plant Taxonomy. Glimpser in Plant Research Vol.5.

Good, P. 1974. The Geography of Flowering Plants.

Jain, S.K. (ed.) 1981. Glimpses of Indian Ethnobotany.

5.2.2(13)

Radford, A.E. 1986. Fundamentals of Plant Systematics. Harper and Row Publishers.

Sivarajan, V.V. 1985. Introduction to Principles of Plant Taxonomy, Oxford & IBH Co.

Meher-Homji, V.M. & Misra, K.C. 1971. Phytogeography of Indian Sub-continent In : Progress of Plant Ecology in India Vol. I.

Additional Readings :

Greuter, W., J. McNeill et al., (eds.) 1988. I.C.B.N. - adopted by the 14th Int. Bot. Cong. 1987. Regnum Vegetable 118 : 328 pp.

Heywood, V.H. 1967. Plant Taxonomy.

Hutchinson, J. 1967. Key to the Families of the Flowering Plants of the World.

Takhtajan, A. 1969. Flowering Plants : Origin and dispersal.

Cronquist, A. 1968. The Evolution and Classification of Flowering Plants.

Heywood, V.H. 1968. Modern Methods in Plant Taxonomy. Acad. Press, London.

Heywood, V.H. & Moore, D.M. (eds.) 1984. Current Concepts in Plant Taxonomy.

William, F. Grant (ed.) 1984. Plant Systematics, Acad. Press, London.

B-202 Plant Taxonomy & Phytogeography

(Practicals)

1. Study of flowering plants in field.

2. Field and Herbarium methods.

3. Preparations of herbarium specimens/museum specimens. (Students are required to submit Herbarium/Museum specimens)

4. Study of flowering plant with their analytical drawings, description and identification upto family.

5. Practice of handling floras and mannuals for identification of plants (Genus and species).

5.2.2(13)

B-203 Microbiology
(Theory)

Unit I General account; Characteristics, classification and cellular structure of microorganisms; Growth and physiology of microorganisms; Growth curve, continuous and synchronous cultures; Effects of environmental factors on growth, mineral nutrition; Bacterial photosynthesis; Heterotrophy for carbon; Nitrogen fixation.

Unit II Microbial genetics; Genetic recombination in bacteria : transformation, conjunction and transduction; Plasmids, bacteriophages; Multiplication and cycle of phages; Role of microbes in genetic engineering.

Unit III Microbial Ecology : Microbiology of air, water and soil; Microbes in polluted habitats; Biodegradation of organic materials; Brief idea about the role of microbes in cycling of C,N and P; Phylloplane microflora : bacteria, actinomycetes and fungi, methods of study, environmental factors, succession; Rhizosphere microflora; bacteria, actinomycetes and fungi, methods of study, rhizosphere effect, importance of rhizosphere microflora in controlling soil borne plant pathogen.

Unit IV Food and Industrial Microbiology : food spoilage and poisoning; Fermentation and food preservation; Role of microorganisms in sewage treatment; Biogas; Antibiotics and vaccines.

Suggested Readings :

Brande, A.I. (ed.) 1982. Microbiology. W.B. Saunders Co.

Brock, T.D. 1970. Biology of Microorganisms. Prentice Hall Inc.

Gebhartt, L.P. & Nicholes, P.S. 1975. Microbiology. The C.V. Mosby Co., St. Louis.

Pelczar, M.J., Jr. & Reid, R.D. 1972. Microbiology. McGraw Hill Book Co.

Rosenberg, E.R. & Cohen, I.R. 1983. Microbial Biology. Saunders College Publishing.

Additional Readings :

Cottschalk, G. 1986. Bacterial Metabolism. Springer Verlag.

Haynes, W. 1984. The Genetics of Bacteria and the Viruses. CPS Publishers and Distributors, New Delhi.

Hawker, L.E. & Linton, A.H. 1971. Microorganisms : Function, Form and Environment. Edward Arnold.

Kelly, D.P. & Carr. N.G. 1984. The Microbe. Part II. Procaryotes. Cambridge Univ., Press.

Mahy, B.W.J. & Pattison, J.R. (eds.) 1984. The Microbes : Part I Viruses. Cambridge Univ. Press.

Moat, A.G. 1979. Microbial Physiology. John Wiley & Sons.

Norris, J.R. and Richmond, M.H. 1981. Essays in Applied Microbiology.

Rose, A.H. 1983. Food Microbiology. Academic Press, London.

B-204 Microbiology

(Practicals)

1. Fundamentals of microscopy : Bright field, phase contrast, fluorescence, electron microscopy; calibration of microscope and measurement of dimension of microbial cells.

2. Staining of microorganisms : Single staining, double staining (e.g. Gram's reaction), staining of specific cell structures.

3. Preparation of culture media and sterilization.

4. Isolation of pure and axenic culture.

5. Growth of microorganisms in batch culture and calculation of specific growth rate and generation time.

6. Enumeration of microorganisms from various habitats (e.g. soil, air, water, phyllosphere, rhizosphere, litter, etc.).

7. Fermentation of carbohydrates by microorganisms.

8. Effect of UV rays on microorganisms.

9. Measurement of antibiotic sensitivity using absorbant disc.

10. Study of mycorrhizal associations.

11. Quantitative estimation of acetone and water-soluble pigments of cyanobacteria.

12. Estimation of photosynthesis and respiration rate of microorganisms.

S.2.1.(16)

B-205 Plant Biochemistry and Molecular Biology
(Plant Biochemistry 50%, Molecular Biology 50%)
(Theory)

Unit I Bioenergetics : Free energy, enthalpy, entropy, laws of thermodynamics, activation energy, redox potentials, coupled reactions, free energy changes in redox reactions, ATP and its significance; Proteins:Classification and structure; Proteins with enzymatic properties:Structure of active centre, amino acid side chains, co-enzymes and metal ions, specifically, mechanism of enzyme action, kinetics of enzyme catalysed reactions; Inhibition : Competitive, non-competitive, control of enzyme action; Isoenzymes.
Biochemical techniques:Separation methods in plant analysis-chromatography, electrophoresis, centrifugation, gel filtration, autoradiography, southern, northern and western blots.

Unit II Carbohydrates : Classification and structure; Isomerism, synthesis and interconversion of heroxes and pentoses; Lipids : Classification and structure, fatty acids, neutral lipids, polar lipids, glycolipids, synthesis of fatty acids and neutral lipids; Amino acids:protein, non-proteins, structure; Biosynthesis of purines and pyrimidines; Classification of plant alkaloids and plant phenolics; Chlorophyll : Types, biosynthesis, regulation of chlorophyll biosynthesis.

Unit III Structure of nucleic acids : Double helical structure of DNA, right handed and left handed DNAs, m-RNA, r-RNA and t-RNA, secondary and tertiary structures of t-RNA; Biosynthesis of nuclei caids : DNA polymerases and DNA replication in prokaryotes and eukaryotes; reverse transcription; RNA processing:processing of r-RNA & t-RNA, splicing introns and exons, capping and polyadenylation of eukaryotic m-RNA.

Unit IV Genetic code : Deciphering the code and preparation of genetic code dictionary, exceptions to the universality of genetic code; Translation : machinery and mechanism of protein synthesis and m-RNA turnover; autogenous regulation of ribosomal protein synthesis; Operon concept : positive, negative and inducible, repressible control systems; Recombinant DNA technology : restriction endonuclease digestion and ligation of blunt and sticky ends, construction of hybrid DNA and its applications.

Suggested Readings :

Lehninger, A.L. 1983. Principles of Biochemistry.

Dixon, M. & Webb, E.C. 1979. Enzymes.

Goodwin, T.W. & Mercer, E.I. 1933. Introduction to Plant Biochemistry.

Martin, D.W. 1981. Harper's Review of Biochemistry.

West & Todd, 1974. Text Book of Biochemistry.

Karp, G. 1984. Cell Biology.

Royer, G.P. 1982. Fundamentals of Enzymology.

M.R.T.P. International Review of Science, Vols. 1,3,5,6,7.

Brown, T.A. (1989). Genetics, A Molecular Approach, Van Nostrand Reinhold, London.

Freifelder, D. (1990). Molecular Biology, Narosa, New Delhi.

Lewin, B. (1985). Genes, John Wiley.

Watson, J.D. (1990). Molecular Biology of the Gene, 2nd edn., Narosa, New Delhi.

Winkler, U. (1990). Bacterial, Phage and Molecular Genetics, Narosa, Delhi.

Hames, B.D. and M.D. Glover, (1988). Transcription and Splicing, IRL Press, Oxford.

B-206 Plant Biochemistry and Molecular Biology

(Practicals)

1. Estimation of sugars using anthrone and DNSA reagents.
2. Estimation of amino acids using ninhydrin reagent.
3. Estimation of soluble proteins by Follin-phenol reagent.
4. Estimation of NO_3-N by Brucine reaction.
5. Estimation of free inorganic phosphorus by Fiske and Subbar's method.
6. Separation and identification of sugars, amino acids and phenolics by paper and thin layer chromotography.
7. Effect of temperature & pH on the activity of amylase.
8. Effect of substrate concentration on amylase activity. Determination of Umax and km by Michaelis, Menton, linweaver and Burk plots.
9. Time course relationship for the activity of nitrate reductase.
10. Estimation of DNA by diphenylamine reagent.
11. Estimation of RNA by orcinol reagent.
12. Isolation of total bacterial DNA by ethanol precipitation.
13. Demonstration of DNA degradation by nuclease activity.
14. Demonstration of RNA degradation by ribonuclease activity.

5.2:2(13)

B-301 Genetics and Plant Breeding
(Theory)

Unit I Mendelian inheritance and gene interactions : modification of F_2 ratios due to lethality, epistasis, complementary genes, duplicate genes and inhibitory genes; Linkage and crossing over; Eukaryotic chromosomes : morphology and architecture; Models of chromosomes structure - folded fibre and solenoid; Synapsis and synaptonemal complex; Theories of genetic recombination.

Unit II Sources of genetic variation; Mutations : spontaneous and induced; Mutagens and their classification; DNA damage and repair - photoreactivation, excision and repair, retrieval system; Molecular mechanism of mutations - base pair substitution and frame shift; Chromosomal aberrations : origin, meiotic behaviour and role in evolution; Numerical changes in chromosomes : euploidy and aneuploidy; Origin and meiotic behaviour of monosomics, trisomics, haploids, autopolyploids and allopolyploids; Role of polyploidy in evolution.

Unit III Gene concept : one gene one enzyme vs. one gene one polypeptide, cistron recon, muton, overlapping and split genes; Nuclear and cytoplasmic genes : maternal influence vs. maternal inheritance, iojap genes, kappa particles and male sterility; Genetics of sex determination : sex chromosomes and sex determination in moths, Drosophila , man, Melandrium and cucurbits; Sex limited and sex linked traits.

Unit IV Monogenic and polygenic traits; Gene effects and components of phenotypic variance; Genetic variance and its components, variance due to environment, variance due to G x E interaction; Gene frequency in a population, genetic equilibrium and Hardy Weinberg law; Plant introduction, selection and hybridisation for crop improvement; Heterosis and inbreeding depression, hybrid seed production in maize and pearl millet; Mutation breeding : methodology, prospects and limitations.

S.2.12(19)

Suggested Readings :

Ayala, F.J. and Kiger, J.A. 1980. Modern Genetics. The Benjamin/ Cummings Publ. Co., California & London.

Burns, G.W. 1983. The Science of Genetics. MacMillan, New York.

Redei, G.P. 1982. Genetics. MacMillan, New York.

Strickberger, M.W. 1985. Genetics. MacMillan, New York.

Brown, T.A. 1989. Genetics, A Molecular Approach. Chapman & Hall, U.K.

Sybenga, J. 1972. General Cytogenetics. North-Holland, Amsterdam.

Swanson, C.P., Merzm, T. and Young, W.J. 1981. Cytogenetics - The Chromosomes in Division, Inheritance and Evolution. Prentice Hall India Ltd., New Delhi.

Obe, G. 1987. Cytogenetics, Springer Verlag, New York.

Schulz-Shaeffer, J. 1980. Cytogenetics. Springer-Verlag, New York.

Allard, R.W. 1960. Principles of Plant Breeding. John Wiley, New York.

Frankel, R. and Galun, E. 1977. Pollination Mechanisms, Reproduction and Plant Breeding. Springer Verlag, Berlin.

Simmonds, N.W. 1979. Principles of Crop Improvement. Longman, U.K.

IAEA, Manual on Mutation Breeding, 1970. IAEA, Vienna.

B-302 Genetics and Plant Breeding
(Practicals)

1. Numerical problems on recombination, linkage, gene interactions and testing the goodness of fit and independent assortment using chi-square test.
2. Problems on probability in predicting family structures.
3. Pre-treatment, fixation, hydrolysis and staining of root tips for mitotic studies. Camera lucida drawings of well spread metaphase chromosomes and preparation of permanent slides (atleast five permanent slides to be submitted).
4. Collection and fixation of flower buds for meiotic studies. Scoring of different configurations, camera lucida drawings of diakinesis and metaphase I and preparation of permanent slides (atleast five slides to be submitted).
5. Study of permanent slides on chromosomal abnormalities.
6. Scoring and estimation of percent pollen sterility of freshly collected pollens using acetocarmine.
7. Emasculation and hybridisation.

B-303 Population and Community Ecology
(Theory)

Unit I Scope of Ecology; Concepts pertaining to limiting factors; Population and community concepts; Progress of plant ecology in India.

Unit II Environmental factors - Soil, water, light, temperature and fire factors; Environmental stresses - water pollution and air pollution; soil erosion.

Unit III Population growth; Survivorship and life table analysis; Population dynamics and plant population regulation; Population interactions - Gause hypothesis, resource competition, symbiosis, predation, herbivory, co-existence; Ecotypic differentiation; C-S-R and r & k strategies.

Unit IV Structure of plant community - Analytic and synthetic characters of community, life form and biological spectrum, diversity and dominance indices; Methods of studying vegetation - plot and plotless sampling techniques and remote sensing; Succession and climax - causes and types of succession; Climax concept and climax hypotheses - monoclimax, polyclimax, information theory and climax pattern hypothesis.

Suggested Readings :

Daubenmire, R. 1974. Plants and Environment. John Wiley & Sons. New York.

Hanson, H.C. and Churchill, E.D. 1963. Plant Communities. Reinhold Pub. Corp.

Miller, C.E., Turk, L.M., and Foth, H.D. 1965. Fundamental of Soil Science. John Wiley & Sons, New York.

Kormondy, E.J. 1978. Concepts of Ecology. Prentice Hall of India, New Delhi.

Oosting, H.J. 1956. The Study of Plant Communities. San Fransisco.

Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders, Philadelphia.

Whittaker, R.H. 1975. Communities and Ecosystems. McMillan.

Silverton, J.W. 1982. Introduction to Plant Population. Longman.

Grime, J.P. 1979. Plant Strategies and Ecosystem Processes. John Wiley & Sons, New York.

Harper, J.L. 1977. Population Biology of Plants. Academic Press, New York.

Smith, W.H 1981. Air Pollution and Forests. Springer Verlag, New York.

White, J. 1985. Studies on Plant Demography. A Festschrift for John L. Harper, Acad. Press, London.

Crawley, M.J. 1986 (ed.). Plant Ecology. Blackwell Scientific Publication, Oxford.

Hanzen, W.E. 1970. Readings in Population and Community Ecology. W.B. Saunders Co. Philadelphia.

Kramer, P.J. 1949. Plant and Soil Water Relationship. McGraw Hill, New York.

Misra, R. 1968. Ecology Workbook. Oxford & IBH, Delhi.

Muller-Dombois, D. and H. Ellenberg, 1974. Aims and Methods of Vegetation Ecology. John Wiley & Sons, New York.

Weaver, J.E. and Clements, F.E. 1988. Plant Ecology, McGraw Hill.

B-304 Population and Community Ecology

(Practicals)

1. Study of the interactions between plants and environment :
   - (i) Study of micro climatic conditions in open and closed communities.
   - (ii) Study of plastic response of plant species under contrasting environmental conditions.
2. Study of soil profile.
3. Study of physico-chemical properties of soil-porosity, texture, water holding capacity, organic matter content.
4. Study of survivorship of plant populations and life table analysis.
5. Study of analytic characters of plant community using plot and plot-less methods.
6. Study of species diversity and dominance in plant communities.
7. Study of similarity between plant communities using index of similarity and dissimilarity.
8. Study of plant succession on abandoned jhum fallows.

B-305 Plant Physiology
(Theory)

Unit I Water relations in plants : Absorption and translocation of mineral salts; Transpiration; Stomatal physiology; Transport of organic solutes; Partitioning and control mechanisms in transport of organic solutes. Water Stress : Drought, frost, and salinity; Mechanism of plant response to water and related stresses. Mineral Nutrition in plants : Essential elements, deficiency and toxicity symptoms, chelates.

Unit II Plant Metabolism : Photosynthesis - photosynthetic structures, pigment protein complexes, mechanism of pigment system function, non-cyclic and cyclic electron flow, photophosphorylation, fixation of CO_2, C_3, C_4 and CAM paths of carbon-fixation, photorespiration; Respiration : oxidation of carbohydrates - Glycolysis and TCA; Oxidation of fats, β -oxidation, α - oxidation; Terminal electron transport chain - composition localization and operation, coupling of photophosphorylation to electron transport in mitochondria, sites and mechanism of phosphorylation; Physiological chemistry of nitrogen fixation, the nitrogenase system, electron transport, conversion of nitrate to NH_3, assimilation of NH_3.

Unit III Plant growth regulators : Auxins, gibberellins, cytokinins, abscisic acid and ethylene - metabolism movement, physiological effects and mechanism of action.

Unit IV Growth and development; Kinetics of growth. Photosynthetic rates : efficiencies in crop production, source sink relationship; Germination and dormancy; Flowering; Photoperiodism and Vernalization; Phytochrome; Biological rhythms, senescence and abscission.

Suggested Readings :

Salisbury, F.B. & Ross, C.W. 1986. Plant Physiology.

Noggle, G.R. & Fritz, C.J. 1977. Introductory Plant Physiology.

Goodwin, T.W. & Mercer, E.I. 1983. Introduction to Plant Biochemistry.

Kramer, P.J. 1980. Plant & Soil Water Relationships - A Modern Synthesis.

S.2.2(23)

Leopold, A.C. & Kreidman, P.E. 1980. Plant Growth and Development.

Wilkins, M.B. 1983. Advanced Plant Physiology.

Gregory, R.P.F. 1989. Biochemistry of Photosynthesis.

Lentin & Atkin, 1989. Hormone action in Plant Development.

Boop, 1988. Plant Growth Substances.

Annual Reviews of Plant Physiology (Acad. Press).

Encyclopaedia of Plant Physiology (Springer-Verlag).

Steward, F.C. Plant Physiology Vol. 1-6.

Wareing, C.F. & Phillips, I.D.J. 1983. Growth and Differentiation in Plants.

B-306 Plant Physiology
(Practicals)

1. Determination of the effect of temperature and chemical treatments on the permeability properties of cell membranes.
2. Determination of water potential of plant tissues by gravimetric method.
3. Study of structure and distribution of stomata of dicot and monocot leaves.
4. Measurement of transpiration rate by Cobalt Chloride method.
5. Measurement of respiration by continuous flow method.
6. Estimation of catalase, peroxidase and total dehydrogenase activity in plant tissues.
7. Separation of chloroplast pigments by paper chromotography and partitioning between solvents. Determination of absorption spectra of the separated pigments.
8. Study of the effect of light intensity on Hill reaction activity in isolated chloroplasts.
9. Measurement of photosynthesis by Winkler's method - Effect of light quality, intensity and CO_2 concentration.
10. Effect of kinetin and gibberellic acid on radish cotyledon expansion.
11. Influence of kinetin and light on lettuce seed germination.

5.2.2(a)

B-401 Morphology, Embryology and Differentiation
(Theory)

Unit I Cell differentiation, polarity and symmetry.

Unit II Flower development; Morphology of flower with special reference to stamen, carpel and placenta.

Unit III Hormonal regulation of sex expression, a general account of microsporogenesis, male gametophyte development; Pollen and pistil interaction, factors influencing pollen germination and pollen tube growth, effects of growth hormones and radiation on pollen germination and pollen tube growth.

Unit IV Megasporogenesis and megagametogenesis and patterns of gametophyte organization; Embryo and endosperm development, effects of growth hormones and radiation on embryogenesis; Apomixis and polyembryony; Seed structure with emphasis on seed coat and seed appendages; Tissue culture technique, anther, embryo , endosperm protoplast culture and somatic hybridization (a general account).

Suggested Readings :

Sattler, R. (ed.) 1970. Theoretical Plant Morphology. London University Press, The Hague.

Maheshwari, P. 1950. An Introduction to the Embryology of Angiosperms. McGraw Hill Book Co. New York.

Sporne, K.R. 1974. The Morphology of Angiosperms. Hutchinson University Library, London.

Wardlaw, C.W. 1970. Cellular : Differentiation in Plants and other Essays. Manchester Univ. Press, New York.

Johri, B.M. (ed.) 1982. Experimental Embryology of Vascular Plants. Narosa Pub. House, New Delhi.

Wareing, P.F. and Phillips. I.D.J. 1983. Growth and Differentiation in Plants. Pergamon Press, New York.

Johanson, D.A. 1949. Plant Microtechnique. McGraw Hill Book Co., New York.

Sinnot, E.W. 1960. Plant Morphogenesis. McGraw Hill Book Co., New York.

5:2:2(25)

B-402 Morphology, Embryology and Differentiation
(Practicals)

1. Demonstration of polarity.
2. Study and preparation of dissected whole mounts of endothelium & tapetum.
3. Squash preparations of tapetum, microspore mother cells, dyads, tetrads and microspores.
4. Study of physical and chemical agents on :
   (a) anther (b) pollen development (c) pollen germination and pollen tube growth.
5. Microdissection :
   (a) pollinia (b) embryo (c) endosperm.
6. Study of vasculature of various floral parts.
7. Preparation of microtome slides.
8. Study of permanent slides.
9. Tissue culture techniques.

S.212(24)

B-403 Ecosystem Analysis and Biostatistics
(Ecosystem Analysis 75%, Biostatistics 25%)
(Theory)

Ecosystem Analysis :

Unit I Concepts pertaining to ecosystem; Major ecosystems of the world; Forest, grassland, desert, mountain, freshwater and marine ecosystems.

Unit II Ecosystem function : Flow of energy along food chains; Primary productivity of forest, grassland and aquatic ecosystems; world pattern of primary productivity; Biogeochemical cycles with particular reference to cycling of carbon, nitrogen, phosphorus and sulphur and hydrologic cycles.

Unit III Ecosystem dynamics : Changes in ecosystem function during succession; Ecosystem stability - resistance and resilliance; Ecosystem responses to stresses - grazing, air pollution, water pollution and shifting cultivation.

Biostatistics :

Unit IV Frequency distribution and measures of central tendency : mean, mode and median, Skewness and Kurtosis; Measures of dispersion : range, mean, deviation, standard deviation and standard error, co-efficient of variation; Random sampling and requisites of randomization; Distribution of sample means, confidence limits, standard error of sum and difference of means, sample estimate of variance; the concept of error, degree of freedom; Null hypothesis and testing of hypothesis; Test of significance : Student 't' test, analysis of variance and 'F' test. Correlation and regression : Co-efficient of correlation, relation between regression and correlation, partial correlation and partial regression; Design of Experiments : Estimate of error, replication and randomisation; Blocking completely randomised and randomised block designs.

Suggested Readings :

Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders, Philadelphia.

Odum, E.D. 1983. Basic Ecology. Halt Saunders International.

Whittaker, W.H. 1975. Communities and Ecosystems, McMillan.

5.2.2(27)

Misra, R. 1968. Ecology Workbook. Oxford & IBH, Delhi.

R.L. Smith. 1986. Elements of Ecology (2nd ed.). Harper & Row Publishers, N.Y.

E.J. Kormondy, 1986. Concept of Ecology (3rd ed.). Prentice Hall of India Pvt. Ltd.

Bishop, O.N. 1980. Statistics for Biology. Longman, London.

Parker, R.E. 1979. Introductory statistics for Biology. Edward Arnold, London.

Bailay, N.T.J. 1965. Statistical Methods in Biology. E.L.B.S. London.

Panse, V.G. and P.V. Sukhatame, 1978. Statistical Methods for agricultural Workers, ICAR.

Snedecor, G.W., and Cochram, W.G. 1967. Statistical Methods, Oxford & IBH, Calcutta.

Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research (Second Edn.), John Wiley & Sons, New York.

B-404 Ecosystem Analysis and Biostatistics

(Practicals)

1. Estimation of phytomass and its distribution in different above and belowground compartments in a grassland community.
2. To determine leaf area index in the grassland community.
3. To determine the standing state of inorganic nutrients (N or ash) in different producer compartments of grassland ecosystem.
4. To study the effect of grazing/disturbance on biomass and nutrient (N or ash) accumulation in producer compartment of grassland ecosystem.
5. To determine primary productivity of plant community by :
   (i) Harvest method
   (ii) Light and Dark bottle method
6. To study litter decomposition by measuring soil respiration.
7. To study the insect herbivory in plant community.
8. To collect sample using random number tables.
9. Tabulation of data for different types of classifications.
10. Diagrammatic and graphic representation of data - one and two dimensional diagrams.
11. Calculation of arithmetic mean and median from raw data, ungrouped data and grouped data.
12. Students 't' test for an assumed population mean and difference between two population means.

Special Paper

B-405 (i) Microbial Ecology

(Theory)

Unit I Microbial community : Structure and organisation, species diversity; Habitat and niche; Food chain; Application of *in vitro* information to conditions *in vivo*.

Unit II Dispersal centre : Duration, efficiency, active and passive dispersal; Colonization processes : succession and climax.

Unit III Tolerance : Interspecific relationships - symbiosis, competition, parasitism; Effects of microorganisms on their surroundings.

Unit IV Microorganisms and biochemistry with reference to C,N, P, and S cycles; Effect of microorganisms on morphology of plants.

Suggested Readings :

Laskin, A.I. and H. Lechevalier, 1978. Microbial Ecology, C.R.C. Press, Cleveland, Ohio.

Alexander, M. 1979. Advances in Microbial Ecology. Plenum Press, New York.

Cambell, R.E. 1977. Microbial Ecology. Blackwell Scientific Publications, Oxford, England.

Lynch, J.M. and N.J. Poole, 1979. Microbial Ecology. A Conceptual Approach. Blackwell Scientific Publication, Oxford, Eng.

Louitt, M. and J.A.R. Miles, 1978. Microbial Ecology. Springer Verlag, Berlin, West Germany.

Additional Readings :

Atlas, R.M. and R. Bartha, 1980. Microbial Ecology - Fundamentals and Applications. Addison-Wesley Publishing Company. Reading, England.

Bull, A.T. and J.H.H. Slatter, 1982. Microbial Interactions and Communities. Academic Press, England.

Harley, J.L. and S.E. Smith, 1983. Mycorrhizal Symbiosis. Academic Press England.

Special Paper

B-406 (i) Microbial Ecology

(Practicals)

1. Basic instruments and their principles.
2. Culture techniques of certain dominant groups of micro-organisms.
3. Growth measurement of microorganisms.
4. Morphology of dominant microbes isolated from soil, air and litter.
5. Effect of certain physical and chemical factors on growth of microbes.
6. Study of seedlings.
7. Study of mycorrhizal association and its impact on seedling survival.

S.V.2(30)

Special Paper

B-405 (ii) Ecology and Management of Forest Ecosystem
(Theory)

Unit I Forests and forest environment - Structure of forest ecosystem; Forest microclimate; Forest soil; Major forest types of the world; Forest types of India with emphasis on forest types of Himalayan range.

Unit II Ecophysiology of forest trees - growth of forest trees-vegetative and reproductive; Growth form of trees - tree architecture, bole form, root form; Characteristics of tropical trees; Regeneration of forest trees.

Unit III Forest ecosystem functions - Primary productivity of forest ecosystem, methods of measurement, comparison of productivity of major forest ecosystems of the world; Litter production and decomposition; Nutrient cycling in forest ecosystem; Forest response to disturbances; Forest influences on climate, soil and hydrology.

Unit IV Forest ecosystem management - Principles of forest management; Sustained yield and methods of yield regulation; Social forestry and agro-forestry; Application of remote sensing in forestry.

Suggested Readings :

Puri, G.S. 1960. Indian Forest Ecology, Vol.I & II.

Dwivedi, A.P. 1980. Forestry in India, Jugal Kishore & Co., Dehradun.

Longman, K.A. and Jenik, J. 1974. Tropical Forest and its Environment. Longman, London.

Reichle, D.E. (ed.) 1981. Dynamic properties of Forest Ecosystems. Cambridge Univ. Press, Cambridge.

Richards, B.N. 1974. Introduction to the Soil Ecosystem. Longman, New York.

Richards, P.W. 1952. The Tropical Rain Forest. Cambridge Univ. Press, Cambridge.

Whitmore, T.C. 1975. Tropical Rain Forests of the Far East. Clarendon Press, London.

Sutton, S.L., Whitemore, T.C. and Chadwick, A.C. 1983. Tropical Rain Forest : Ecology and Management. Blackwell Scientific Pub., Oxford.

Lieth, H. and Whittaker, R.H. (eds.) 1975. Primary Productivity of the Biosphere. Springer Verlag, New York.

5.2.2(31)

Mathur, V.P. 1981. Forest Management.

Bal Kathirosan, S. 1983. Essentials of Forest Management.

Sharpe, G.W., Hendee, C.L. & S.W. Allen 1976. Introduction to Forestry. Mac Graw Hill.

Special Paper

B-406 (11) Ecology and Management of Forest Ecosystems (Practicals)

1. Study of botanical composition of forest stands of different ages.
2. Determination of importance value index (IVI) of tree species in selected forest stands.
3. Study of aboveground stratification in a forest stand through profile diagram.
4. Study of litter accumulation in contrasting forest stands and contribution of different species and plant parts to standing crop of litter.
5. Study of litter decomposition through litter bag techniques and soil respiration measurement.
6. Study of soil profile in a forest ecosystem.
7. Study of tree population structure in protected and disturbed forest stands.
8. Study of forest microenvironment through measurement of light, temperature, humidity etc., in closed and open stands.
9. Effect of gap formation in forest on tree seedling population.

5:2:2(BR)

Special Paper

B-405 (iii) Radiation Botany
(Theory)

Unit I Radiations - ionising and non-ionising; Radio-isotopes; Mechanism of action of ionising radiations in biological systems.

Unit II Radiosensitivity and factors controlling its radiosensitization and radioprotection.

Unit III Effect of ionising radiation on differentiation and reproduction in plants.

Unit IV Effect of ionising radiations on plants; Growth and yield; Application of radiation in agriculture.

Suggested Readings :

Maurice, E. & A. Forssbert (eds.) 1960. Mechanisms in Radiobiology. V.I. General Principles. Multicellular organisms. Academic Press, N.Y.

Alexander, P. & Z.M. Bacq (eds.) 1960. Fundamentals of Radiobiology. Academic Press.

Whitson, G.L. (ed.) 1972. Concepts in Radiation Cell Biology, Academic Press, New York.

Casarett, A.P. 1968. Radiation Biology. Prentice Hall Ind.

Lannunziapa, M.F. 1984. Isotopes and Radiation in Agricultural Sciences, Vol. 1 & 2.

Additional Readings :

Silini, G. (ed.) 1968. Radiation Research. Amsterdam, North Holland.

Ebert, M & A. Howard, (eds.) 1974. Current Topics in Radiation Research. Amsterdam, North Holland.

Kamen, M.D. 1957. Isotopic Tracers in Biology. An Introduction to Tracer Methodology. Academic Press, New York.

Lawrence, J.H. 1964. Radioisotopes and Radiation : Recent Advances in Medicine, Agriculture and Radiation. Dever Publications, N.Y.

Tobias, C.A. & P. Todd (eds.) 1974. Space Radiation : Biology and Related Topics. Academic Press, New York.

Augestein, 1983. Advances in Radiation Biology. Vol. 10 & 11. Academic Press.

Special Paper

B-406 (iii) Radiation Botany

(Practicals)

1. Study of effects of γ-rays on plant growth and development.
2. Study of pollen radiobiology.
3. Study of radiosensitivity of plants.
4. Study of γ- rays effects on meristem and tissue differentiation in plants.
5. Study of radiosensitization and radioprotection.

Special Paper

B-405 (iv) Ecology and Physiology of Algae
(Theory)

Unit I Ecology of algae inhabiting rivers, streams, lakes, ponds and other bodies of freshwater; Soil algae and their significance; Brief idea about the ecology and distribution of oceanic and littoral algae.

Unit II Symbiotic associations of algae; Algae as food for other organisms (grazing); Eutrophication; Effects of pollutants on algae; Algae and assessment of water quality; Use of algae in wastewater treatment systems.

Unit III Nitrogen fixation and assimilation; Phosphorus uptake and metabolism in algae; Algal pigments.

Unit IV Extracellular products of algae; Anoxygenic photosynthesis in cyanobacteria; Heterotrophy for carbon; Physicochemical factors affecting growth, metabolism and reproduction.

Suggested Readings :

Carr, N.G. and Whitton, B.A. (eds.) 1973. The Biology of Blue-green. Blackwell, Oxford.

_____ and _____(eds.) 1982. The Biology of Cyanobacteria. Blackwell, Oxford.

Fogg, G.E. 1975. Algal Culture and Phytoplankton Ecology. Univ. Wisconsin Press.

Jackson, D.F. (ed.) 1964. Algae and Man. Plenum Press, New York.

Lewin, R.A. (ed.) 1962. Physiology and Biochemistry of Algae. Academic Press, New York.

Morris, I. (ed.) 1980. The Physiological Ecology of Phytoplankton. Blackwell, Oxford.

Round, F.E. 1981. The Ecology of Algae. Cambridge Univ. Press.

_____ and Chapman, V.J. (eds.) 1983. Progress in Phycological Research. Vols. I & II. Elsevier.

Shubert, L.E. (ed.) 1981. Algae as Ecological Indicators : Academic Press, New York.

Stewart, W.D.P. (ed.) 1974. Algal Physiology and Biochemistry. Blackwell, Oxford.

Special Paper

B-406 (iv) Ecology and Physiology of Algae

(Practicals)

1. Collect and identify algae from various habitats.
2. Calculate relative abundance of various algal taxa and Shannon diversity (d) of the provided sample.
3. Study colonization of algae on glass slides.
4. Study epiphytic aerial algae on the bark of trees.
5. Study soil algae by direct observation or implanted slide technique.
6. Using the compound index find out the trophic status of given sample.
7. Quantitatively estimate acetone/methanol-soluble pigments of algae.
8. Estimate the amount of water-soluble pigments in cyanobacteria samples.
9. Prepare culture media for freshwater algae.
10. Isolate, purify and establish unialgal and axenic cultures.
11. Estimate rate of photosynthesis using light-dark bottle experiment.
12. Estimate photosynthesis and respiration rates of the test alga using gas exchange method.
13. Observe the growth of a test alga in batch culture and calculate its specific growth rate.
14. Using acetylene reduction technique estimate nitrogen fixation rate in the provided samples.
15. Measure uptake of nitrate and phosphate by a test alga.

Special Paper

B-405 (v) Protein Chemistry
(Theory)

Unit I Principles of isolation and purification of plant proteins; Classification of proteins based on shape, solubility, composition and function; Primary, secondary, tertiary and quarternary structure of proteins; Electrostatic interactions in proteins; Equilibrium properties of protein structure, thermal mobility, structural mobility and fluctuation in proteins.

Unit II Hormonal and genetic control of protein biosysthesis; Intracellular factors in the synthesis of cytoplasmic proteins and proteins of subcellular organells; Plant proteins and phenolics : Interaction between phenolics and proteins, phenolics and proteins in the resistance of plants against pathogens.

Unit III Proteins with enzymatic Properties : Structure and composition of active site; Specificity - Structural, sterochemical and catalytic; Mechanism of action : General acid base catalysts, nucleophillic catalysis, electrophollic catalysis; Inhibition and activation of enzyme activity : Inhibitors - competitive, non-competitive, mixed; Activators - essential, non-essential; Kinetics of enzyme catalysed reactions; Allosteric enzymes; Kinetic behaviour, mechanism of allosteric interactions; Enzyme catalysis at subzero temperatures.

Unit IV Extraction and purification of enzymes on large scale : Principles and practices; Principles of industrial enzymology; Immobiolized enzymes : Principles and techniques of immobilization; Properties of immobilized enzymes, applications of immobilized enzymes.

Suggested Readings :

Bisswanger, H. & Schmincke-Otto, E. 1980. Multifunctional proteins, John Wiley.

Tirgensons, B. 1973. Optical Activity of proteins & other Macromolecules. Springer Verlag.

Oxender, D.L. 1987. Protein structure, Folding & Design - 2, Allan R Cirs. N-4.

Wennstein, B. Chemistry and Biochemistry of aminoacids, Peptides & proteins. Vols. 1-3. Marcell Dekker, N.Y.

Harborne, J.B. & Van Sumere, C.F. 1975. The Chemistry & Biochemistry of Plant Proteins. Acad. Press, N.Y.

Litalien, J. 1987. Proteins - Structure & Function. Plenum.

Lehninger, A.L. 1983. Principles of Biochemistry.

Dixon, M. & Webb, E.C. 1979. Enzymes, Acad. Press.

Purich, D.L. 1983. Contemporary enzyme kinetics & mechanism, Acad. Press.

Kurganov, B.I. 1982. Allosteric enzymes - Kinetic behaviour. John Wiley.

Chibata, I. 1988. Immobilised enzymes - Research & Development. Kodansha, Tokyo.

Royer, G.P. 1982. Fundamentals of Enzymology - Rate enhancement, specificity, control & applications. John Wiley.

Hugli, T.E. 1989. Techniques in Protein Chemistry. Acad. Press, N.Y.

Pugsley, A.P. 1989. Protein Tergetting, Acad. Press.

Special Paper

B-406 (v) Protein Chemistry

(Practicals)

1. Estimation of soluble protein by dye binding capacity and Lowrys methods.
2. Determination of total nitrogen by :
   (i) Micro-Kjeldahl's methods
   (ii) Nessler's method.
3. Separation of proteins by (a) Polyacrylamide gel electrophoresis, (b) Gel filtration, (c) Isoelectric focussing & (d) Ion exchange chromatography.
4. Determination of molecular weight of proteins by PAGE, Gel filtration and Ion exchange chromatography.
5. Protein fractionation by Landry - Mourcaux method.
6. Estimation of total free amino acids by Rosen's method.
7. Colorimetric determination of lysine and trytophan in proteins.
8. Partial purification and characterization of some hydrolytic enzyme proteins viz., amylases and urease.
9. Quantitative determination of enzyme activity for urease and amylase from crude as well as partially purified extracts.
   (a) Progress curve for substrate and enzyme concentration.
   (b) Effect of temperature on stability of the enzyme.
10. Protein purification by acetone precipitation and salt fractionation.
11. Estimation of nitrate reduction by immobilised cells.

Special Paper

B-405 (vi) Physiology of Plant Growth & Development
(Theory)

Unit I Growth, differentiation and development defined; Totipotency of cells and its regulation; Basic and applied aspects of plant cell, tissue and organ culture.

Unit II Origin and development of plant growth substance research; The range of biologically active compounds; Endogenous growth regulators; Physiological roles and mechanism of action of auxins, gibberellins, cytokinins, ethylene and abscisic acid.

Unit III Synthetic growth regulators; Discovery, chemical nature, effects on growth and development and mechanism of action of cycocel, phospon D, B-nine, AMO 1618, morphactins, etherel and other growth retardants and phenolics.

Unit IV Role of growth regulators in modern agriculture and horticulture; Environmental and hormonal regulation of - physiology of flowering, seed germination and dormancy; Physiological and biochemical adaptations of high altitude plants; Senescence and its control.

Suggested Readings :

Leopold, A.C. & P.E. Kreidman, 1980. Plant Growth and Development. Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Krishnamurthy, H.N. 1981. Plant Growth Substances. Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Purohit, A.N. & K. Gurumurthy, 1980. Views on Physiology of Flowering. Bishen Singh & Mahendra Pal Singh.

Encyclopaedea of Plant Physiology. Vol. 9,10 & 11. Springer Verlag, 1980-1982.

Reinert, J. & Y.P.S. Bajaj, (eds.) 1977. Applied and Fundamental aspects of plant Cell. Tissue and Organ Culture. Springer Verlag.

Additional Readings :

Annual Review of Plant Physiology - Academic Press (Recent Volumes.

Hillmann, J.R. 1984. Metabolism of Plant Hormones.

George, E.F. & P.D. Sherrington, 1984. Plant Propagation by Tissue Culture. Exegetics Ltd., U.K.

Special Paper

B-406 (vi) Physiology of Plant Growth & Development

(Practicals)

1. Bioassay of plant growth substances.
2. Effects of auxin on root initiation.
3. Effects of coumarine, thiourea, urea, actinomycin D, 2, 4 - dichlorophenoxy - acetic acid, 2,4 - dinitrophenol on lettuce seed germination.
4. Preparation of standard curve for IAA.
5. Extraction and colorimetric assay of peroxidase, polyphenol oxidase and IAA - oxidase.
6. Polyacrylamide gel electrophoresis of plant proteins and some of the above mentioned enzymes.
7. Preparation of standard curves and measurements of total and O-dihydroxyphenols.
8. Preparation of standard curve for starch.
9. Induction of amylase synthesis in aleurone cells of barley grains by gibberellic acids.
10. The effect of kinetin on chlorophyll retention in detached leaves.
11. Effect of auxin and cytokinin on callus tissue differentiation.
12. Effects of certain synthetic plant growth regulators on the development of selected species.

S.2.1(40)

Special Paper

B-405 (vii) Applied Cell & Molecular Genetics

(Theory)

Unit I Genome analysis and reconstruction; Diploidisation of polyploids; Production, meiotic behaviour and breeding strategy of novel genome combinations; Prospects and limitations; Application of genome analysis in ascertaining the course of plant evolution; Establishing species proximity using interspecific hybridisation.

Unit II Production of alien chromosomes addition and substitution lines in crop plants, their meiotic and breeding behaviours, uses and limitations; Production, breeding behaviour, meiotic behaviour of primary, secondary, tertiary and compensating trisomics; Trisomic analysis; Production of monosomics in polyploids, their breeding and meiotic behaviours; Monosomic analysis.

Unit III Addition of alien genetic material through chromosome fragment transfer; Production, meiotic behaviour and breeding behaviour of translocation heterozygotes, use of translocation heterozygosity in production of permanent hybrids, achievements and limitations; Production and uses of translocation tester sets.

Unit IV Vectors, their horizontal and vertical mobility and use in intercellular gene transfers; Alien DNA insertions in vector DNA; Preparation of gene library and its analysis; Amplification of target sequences using PCR; Techniques of DNA sequencing.

Suggested Readings :

Burnham, C.R. 1962. Discussions in Cytogenetics. Burgess, Minnesota.

Khush, G.S. 1973. Cytogenetics of Aneuploids. Acad. Press, New York.

Swaminathan, M.S., Gupta, P.K. and Sinha, U. (eds.) 1983. Cytogenetics of Crop Plants. MacMillan India Ltd., Delhi.

Sybenga, J. 1972. General Cytogenetics. North-Holland, Amsterdam.

Lewin, B. 1985. Genes. John Wiley & Sons, New York.

Setlow, J.K. and Hollaender, A. 1979. Genetic Engineering Principles and Methods, Vol. I. Plenum Press, N.Y.

_____ and _____ 1980. Genetic Engineering Principles and Methods, Vol. II. Plenum Press, N.Y.

Glover, D.M. (ed.) 1985. DNA Cloning, Vol. II IRL Press, Oxford.

Scott, W.A. and Werner, R. 1977. Molecular Cloning of Recombinant DNA. Acad. Press, N.Y.

Williamson, R. (ed.) 1982. Genetic Engineering 3. Acad. Press, N.Y.

Special Paper

B-406 (vii) Applied Cell & Molecular Genetics

(Practicals)

1. Interspecific hybridisation through crossing.
2. Study of meiosis of some interspecific hybrids and their progenies.
3. Meiotic studies of some gamma ray and EMS treated plants.
4. Demonstration of presence of plasmids in E. coli and Rhizobium using vertical agarose gel electrophoresis.
5. Restriction enzyme digestion of DNA.

Special Paper

B-405 (viii) Angiosperm Taxonomy
(Theory)

Unit I History of Plant Taxonomy; Scope of Taxonomy, Systematics and classification; Field herbarium methods; International code of botanical nomenclature : plant nomenclature; Type method and population concept; Citation and nomenclature.

Unit II Study of plants being used by tribes inhabiting North-East India.

Unit III Acquaintance with the forest flora of North-East India. Preparation of taxonomic account and monographs.

Unit IV Recent Trends in Plant Taxonomy : phyletic vs. phenetic and cladistic Taxonomy; Taximetrics; Biosystematics; Chemotaxonomy and Cytotaxonomy.

Suggested Readings :

Erdtmom, G. 1966. Pollen Morph. & Plant Taxonomy. New York.

Henry, A.N. & M. Chandrabose, 1979. An Aid to I.C.B.N., Today & Tomorrow Print & Publ., New Delhi.

Hill, Albert, F. 1952. Economic Botany. McGraw Hill Book Comp. New York.

Heywood, V.H. 1967. Plant Taxonomy.

Heywood, V.H. 1968. Modern Methods in Plant Taxonomy, Acad. Press, London.

Heywood, V.H. (ed.) 1973. Taxonomy & Ecology, Acad. Press, London.

Hutchinson, J. 1973. The families of flowering plants. Oxford Clarendon Press.

Index Kewensis, London.

Jain, S.K. (ed.) 1981. Glimpses of Indian Ethnobotany. Oxford & IBH, New Delhi.

Jain, S.K. & R.R. Rao, 1977. A Hand Book of field & Herbarium methods. Today & Tomorrow, New Delhi.

Jain, S.K. & R.R. Rao, 1981. An Assessment of Threatened plants of India, B.S.I., Howrah.

Puri, G.S., V.M. Meher-Homji, R.K. Gupta & S. Puri, 1983. Forest Ecology, Vol. I.

Radford, A.E. 1986. Fundamentals of Plant Systematics. Harper & Row Publ. Inc. New York.

Nair, P.K.K. (ed.) 1980. Modern trends in Plant Taxonomy. Glimp. in Plant Researches V.

5 2 2 (72)

Nayar, M.P. & A.R.K. Sastry (ed.) 1987, 1989, 1990. Red Data Book of Indian Plants. Vol. I, II & III, B.S.I. Calcutta.

Santapan, H. & A.N. Henry, 1976. A Dictionary of the Flowering Plants in India, P.I.D., C.S.I.R., New Delhi.

Sivrajan, V.V. 1985. Introduction to principles of Plant Taxonomy. Oxford & IBH Comp., New Delhi.

Stace, Clive, A. 1984. Plant Taxonomy & Biosystematics. Edward Arnold, Publ. Ltd., London.

Sokal, R.R. & P.H.A. Sneath, 1973. Principles of Numerical Taxonomy.

Swain, T. 1974. Chemical Plant Taxonomy.

Willis, J.C. (Rev.) 1973. A Dictionary of the Flowering Plants and Ferns, Cambridge Univ. Press.

Special Paper

B-406 (viii) Angiosperm Taxonomy

(Practicals)

1. To study the floristic aspects of an area :

   (a) Collection of plants

   (b) description and

   (c) analytical illustrations of plants collected.

2. Preparation of keys for identification and preparation of floristic account.

(iii) Revision of the syllabus for M.A.(Economics)

The Department of Economics has proposed a revision of the M.A.syllabus. The proposal was considered and approved at the Board of Post-Graduate Studies meeting held on 11.5.92 and at the Local School Board (Social Sciences) meeting held on 14.5.92.

The proposal alongwith the revised syllabus is placed at Annexure-'A' for consideration of the Council.

PROPOSAL TO REVISE M.A.(ECONOMICS) SYLLABUS

The Department of Economics, NEHU propose to introduce a few changes in the syllabus of M.A.(Economics), in order to revise and update the structure and contents of the courses. The following issues are worth mentioning in this connection. Firstly, these courses were revised last time in 1986. Therefore, it is necessary to revise the content of some of the courses in order to include the latest developments in the field. Secondly, there have been some major changes noticed in the academic circle by the introduction of National Eligibility Test (NET) by UGC for awarding fellowships and lectureships and introduction of new curriculum by UGC for Undergraduate (Honours) and Post Graduate courses. Finally, there have been so many changes in the world economy in general and Indian economy in particular which call for reorientation of the curricula.

Keeping these issues in mind, it has been felt that restructuring of the MA(Economics) courses is overdue. Accordingly the exercise of revising the structure and the course contents was undertaken. For this purpose we consulted the latest syllabi of many Indian universities and also the new curriculum prepared by the UGC for the post-graduate level which takes into account the NET syllabus also.

In order to incorporate the recent developments on the horizon of international and Indian economies, like new international economic order, globalization of Indian economy environmental issues in economic development and so on we propose to introduce some new courses for the first time in post graduate syllabus. For example, courses on Indian Economy Environmental Economics, Dynamic Optimization, Macro-econometric Modelling etc. at both compulsory and optional levels. The complete structure along with the list of courses to be offered is given below. To make the nomenclature of courses more systematic, the courses have been assigned codes; the three digit code indicates a compulsory course, whereas the four digit courses are optional.

The following is the proposed structure :

Code	Name of the Course
First Semester	
ECO 101	Political Economy
ECO 102	Macro-Economic Analysis - I
ECO 103	Mathematics for Economists
ECO 104	Statistical Analysis
Second Semester	
ECO 202	Macro-Economic Analysis - II
ECO 205	Micor-Economic Analysis - I
ECO 206	Public Economics
ECO 207	Economics of Development & Planning
Third Semester	
ECO 305	Micro-Economic Analysis - II
ECO 308	International Trade
Optional 1	
Optional 2	
Fourth Semester	
ECO 409	Indian Economy
ECO 410	Economics of North-Eastern Region
Optional 3	
Optional 4	

Optional courses are to be offered from the following list :

One Semester Courses	
ECO 30001	Theories of Industrial Economics
ECO 3002	International Trade & Monetary Policy
ECO 3003	Computer Programming for Social Scientists
ECO 3004	Static Optimization Techniques
ECO 4001	Industrial Organization in India
ECO 4002	Environmental Economics
ECO 4003	Modern Growth Economics
ECO 4004	Dynamic Optimization Techniques
ECO 4005	International Economics

Two Semester Optional Courses

ECO 3106	Economics of Agriculture - I
ECO 4206	Economics of Agriculture - II
ECO 3107	Econometrics - I
ECO 4207	Econometrics - II
ECO 4307	Econometrics - III
ECO 3108	Economics of Human Resources - I
ECO 4208	Economics of Human Resources - II
ECO 3109	Mathematical Economics - I
ECO 4209	Mathematical Economics - II
ECO 3110	Economics of Third World - I
ECO 4201	Economics of Third World - II
ECO 3111	History of Economic Thought - I
ECO 4211	History of Economic Thought - II
ECO 3112	Urban and Regional Economics - I
ECO 4212	Urban and Regional Economics - II
ECO 3113	Transport Economics - I
ECO 4213	Transport Economics - II
ECO 3114	History of Economic Development - I
ECO 4214	History of Economic Development - II
ECO 3115	Monetary Economic - I
ECO 4215	Monetary Economic - II

Notes :

(i) Out of total 42 courses listed above, 7 are new and 16 have been modified. Course Nos. ECO 207, ECO 308 and ECO 409 are new proposed compulsory courses and Course Nos. ECO 4002, ECO 4004, ECO 4307 and ECO 4215 and new optional courses.

(ii) The compulsory courses ECO 101 through ECO 104, ECO 202, ECO 205 and ECO 206 have been revised and updated. The Optional courses ECO 3001, ECO 3004, ECO 4001, ECO 4003, ECO 4004, ECO 4307 and ECO 4215 are new optional courses.

(iii) Course ECO 207 Economic Development and Planning is being introduced in place of two existing compulsory courses viz., Economics of Development and Techniques and Models of Planning which were offered in second and third semesters respectively.

Further, it is proposed to stop serving the compulsory course Economic Statistics which has been offered in second semester.

(iv) Compulsory course ECO 206 Public Economics has been offered in fourth semester earlier. Now it is proposed to be offered in second semester.

(v) Courses ECO 308 International Trade and ECO 409 Indian Economy are the new courses to be offered in third semesters respectively.

All the revised and new courses have been approved by the Board of Post Graduate Studies in Economics and the School Board of the School of Social Sciences in their meetings held on May 11, 1992 and May 14, 1992 respectively. These revised and new courses may be placed at the next meeting of the Academic Council.

ECO 101 POLITICAL ECONOMY

Unit-1 Emergence of Political Economy

1.1 Political economy - its emergence; historical and institutional background

1.2 Political economy before Smith - Mercantilism and Physiocracy - Factors leading to the emergence and decay; Basic doctrines

1.3 Contributions of Cantillon, David Hume, Quesnay and Turgot,

Unit II The Major Questions in Classical Political Economy, (11)

2.1 The classical theories of value including Labour Theory of Value : Smith and Ricardo

2.2 Classical theories of distribution - Smith, Ricardo, Malthus and Mill

2.3 Classical theories of development - Smith and Mill

2.4 Say's Law of Market and Say's Identity

Unit III Classical School and Its Relevance to Modern Economic Problem, (11)

3.1 Methodological Issues relating to Development theory from Classicists onwards,

3.2 Marx-Surplus Value, Crises, Sraffa's contribution

3.3 Classical Theory and Its relevance to Modern Economic Problems

Unit IV Modern Approach to Polical Economy, (12)

4.1 Neo-mercantilism

4.2 Changing Nature of Social Relation of Production

4.3 Indian Political Economy - Class Politics; Policies and Politics of the Agricultural Sector - Rural Capitalists and the Backward Classes

4.4 Types of Politics and Economic Performances - Demand Polity and Command Polity - Indian democracy with respect to Demand and Command Polity

References,

Blaug, M., Economic Theory in Retrospect, Vicas Publishing House, New Delhi, 1962

Dobb, M., Theories of Value and Distribution since Adam Smith - Ideology and Economic Theory, Cambridge University Press, 1973

Bharadwaj, Krishna: Classical Political Economy and Rise to Dominance of Supply and Demand Theories, Orient Longman, 1973

Bharadwaj, Krishna: On Some Issues of Methods in the [illegible] Analysis of Social Change; Prasanga University of Mysore, 1980,

Bharadwaj, Krishna; "Value Through Exogenous Distribution" in Harcourt and Laing (eds.), Capital & Growth, Penguin Publication,

Dobb, M., Political Economy and Capitalism - Some Essays in Economic Tradition; Routledge and Kegan Paul Publishers, 1983

Gide and Rist, A History of Economic Doctrine, Oxford U.P., Calcutta, 1973

Rudolph, Lloyd, I. and Rudolph, S.H., In Pursuit of Lakshmi-The Political Economy of Indian State, Orient Longman, 1987

Whynes, David, What is Political Economy?, Basil Blackwell Publisher Ltd., U.K., 1984

Mitra, Ashok, Terms of Trade and Class Relations, Rupa Publications., Calcutta, 1977

Kregel, J.A., Rate of Profit, Distribution and Growth, Two View, Macmillan, 1971.,

Morishima, M., Equilibrium Stability and Growth of Multisectoral Analysis, Oxford Clarendon Press, 1964

Keunno, R.M., The Theory of General Equilibrium,

Frankell, F.India's Political economy, Oxford University Press, Delhi, 1978

In addition to the above mentioned references, for Unit-IV, the students may be advised to consult relevant issue of Political Economy Supplement in Economic and Political Weekly and other relevant journals.

ECO 103 MATHEMATICS FOR ECONOMICS

Unit-I (11)

1.1 Number system -Real and Imaginary

1.2 Vector and Vector Spaces, Vector and Points,

1.3 Point set Theory : Bounded and Unbounded Sets, Hyperplanes and half planes, linear, and metric spaces.,

1.4 Functions : Linear and non-linear, convex and concave,

Unit-II Matrix Operations (12)

2.1 Elementary Mathematic Operation with Matrices,

2.2 Solution of simultaneous equations : Rank of the matrix, matrix inversion,

2.3 Linear and orthogonal transformation, Eigen Value Problems of Matrices,

2.4 Linear Programming Problems : Feasible and optimal solution. Duality Theorem. Optimal solution (Graphical Method),

Unit-III Calculus (11)

3.1 Principles of Differentiation. Partial and total differentiation, Differentiation of Matrices,

3.2 Maxima and Minima - unconstrained and constrained,

3.3 Differentiation of implicit functions,

3.4 Principles of integration,

Unit-IV Difference and differential Equations: First, Second and Higher order,

References:

Allen, R.G.D., Mathematical Analysis for Economists, Macmillan, 1976.

Chiang, A.C., Fundamental Methods of Mathematical Economics, McGraw Hill and Kogakusha, New Delhi, 1974.

Yamane, T., Mathematics of Economists, Prentice Hall, New Delhi, 1973.

Lewis, J.P., Introduction to Maths for students of Economics., Macmillan, London, 1978.

Baumol, W.J., Economic Theory and Operational Analysis, Prentice Hall, 1977.

Baumol, W.J., Economic Dynamics, Macmillan, London, 1970.

Samuelson, P.A., Foundations of Economic Analysis, McGraw Hill, Tokyo, 1967.

Hadley, G., Linear Algebra, Addison-Wesley Pub. Co., Tokyo, 1973.

5:2:3:(9)

ECO 104 TECHNIQUES OF STATISTICAL ANALYSIS

Unit-I. Theory of Statistics (12)

1.1 Statistics - nature and scope. Types of Statistics descriptions and inferential

1.2 Probability theory - different concepts and approaches

1.3 Laws and Axioms of Probability

1.4 Probability Distributions Binomial, Poisson, Normal, Betaand Gamma functions and their important Characteristics

1.5 Mathematical expectation-Expectation of sum and Product of variables, concept of co-variance

Unit - II. Correlations and Regression (11)

2:1 Two variable linear regression extended to multivariate case. Method of estimating the parameters of regression equation and regression model, estimating the variance of the regressor estimates

2:2 Concept of correlation, correla-tion coefficient, partial correlation coefficients

2:3 Non-linear regression models and Logistic Curve

Unit-III Theory of Estimation (11)

3:1 Variables and parameters. Stochastic and non-stochastic variables

3:2 Estimators - Properties of good estimator, BLUE - of the estimators consistency, sufficiency and minimum variance properties

3:3 Method of Estimation : Method of OLS estimation, Maximum likelihood estimations. Point estimation and interval estimation

Unit-IV Hypothesis Testing (11)

4:1 Some specific sampling distributions - t-dist., F - dist. and X 2 - dist. Hypothesis - meaning and types. Test of hypothesis in relation to theory of (a) small sampling (b) large sampling (c) sampling of attributes and (d) sampling of variables.

4:2 Errors of I and II types

4:3 Tests of significance - t, F, 2 and x 2 tests with application

References

1. Bez, K., Quantitative Techniques in Economics, Kalyani Publishers, New Delhi , 1990

2. Chakravarty, I.M., Handbook of Applied Statistics, Wiley and Sons, 1967

3. Freund, J., Modern Business Statistics, Pitman, London, 1959.

4. Hogg, R., Introduction to Mathematical Statistics, Mcmillan, London, 1959.

5. Kapoor and Saxena, Mathematical Statistics

6. Goon, Gupta & Dasgupta, Fundamentals of Statistics, World Press, Calcutta, 1970.

7. Hoel, P.G., Introduction to Mathematical Statistics, Wiley and Sons, 1954

8. Lehman, E.L., Testing Statistical Hypothesis, Wiley & Sons, 1956

9. Rao, C.R., Linear Statistical Inference and Applications Wiley & Sons, 1965

10. Wallis, W.A., Statistics - A new Approach, The Free Press Illinois, 1956.

Standard Reference Book

A Stuart & M, Kendall, Advance Theory of Statistics, Vol. 3

ECO 202 MACROECONOMIC ANALYSIS - II

Unit - I Money and Inflation (10)

1.1 Quantity Theory of Money ; Friedman's Restatement, Pigou Effect and Real Balance Effect.

1.2 Inflation ; Nature, Theories and Types

1.3 Philips Curve Analysis

Unit - II Macro-Economics of An Open Economy (10)

2.1 Extension of Basic Keynesian Model : The Dynamic Case

2.2 IS - LM Analysis for an Open Economy : Stability Conditions, Correspondence Principle, Model by Neo-Classical School

2.3 Foreign Trade Multiplier : Fixed and Flexible Cases

Unit - III Fluctions in the Economic Activity (11)

3.1 Causes and Origins of Business Cycle

3.2 The Accelerator and Multiplier Principles and their Interactions

3.3 Consumption Expenditure and Business Cycle : Keynesian and Hicksian Approaches

3.4 Business Cycle Models : Samuelson-Hicks, Goodwin, Kalecki and Philips Models, Schumpeter Clock

Unit-IV Macroeconomic Models of Economic Growth (12)

4.1 Growth Theory - Nature, Problems of Aggregation

4.2 One Sector Models of Growth :Har[illegible] and Domar, Instability of Equilibrium Path

4.3 Neo-Classical Models : Solow, Swan and Phelps

4.4 Criticisms of Neo-Classical Models: Modern Cambridge School

References:

1. Friedman, M.(Ed): Studies in Quantity Theory of Money, University of Chicago Press, (1956)
2. Makinon, G.T.,: Money, the Price Level and Interest Rates, Prentice Hall, New Delhi (1980).
3. Patinkin, D.: Money, Interest and Prices, Harper and Row, New York, 1965
4. Mueller, M.G. (ed.), Readings in Macroeconomics, Wiley and Sons, N.Y., (1977).
5. Ackley, G.: Macroeconomics: Theory and Policy, Macmillan, N.Y., (1978)
6. Levacic, R. and Rebman, A; :Macroeconomics, Macmillan, London, (1982)
7. Kenkel, J.L. : Dynamic Linear Economic Models, Gordon and Breach, N.Y., (1974)
8. Branson, W.H.: Macroeconomic Theory and Policy, Universal Book Stall, N. Delhi, (1980)
9. Bobber, S.: Economics of Cycles and Growth, Wiley Eastern, N.Delhi, (1971.
10. Baumol W.J.: Economic Dynamics, Macmillan, N.Y.,(1970)

11. Ott, D., Ott, F, and Yoo, S.: Macroeconomic Theory, McGrowth Hill, N.Y. (1975)

12. Sen, A. (Ed.): Growth Economics, Penguin Books, Hamonds Worth, (1970)

13. Jones, H.G.: An Introduction to Modern Theories of Economic Growth, McGraw Hill, Tokyo, (1976).

14. Allen, R.G.D.: Macroeconomic Theory: A Mathematical Approach, Macmillan, London, (1968)

ECO 205 MICROECONOMIC ANALYSIS I

Unit-I Consumer Behaviour (12)

1.1 Preference Ordering: Violation of the Premises of the indifference curves analysis: Axioms and Utility.

1.2 Revealed Preference Theory

1.3 Recent Developments in the Theory of Market Demand: Constant Elasticity Type Demand Models, Distributed Lag Models of Demand, Linear Expenditure Systems, Lancaster's Model of Consumer Technology.

1.4 Decision Under Uncertainty

Unit-2 Production and Costs (12)

2.1 Production Function: Concepts of Elasticity of Production, Elasticity of Substitution, Isoquant, Isocline, Ridge Line

2.2 Homogeneity and Homotheticity

2.3 Fuctional forms (Linear, Cobb-Douglas CES and Translog)

2.4 Theory of Costs: Short and Long Run, Derivation of Cost Functions from Production Functions

Unit-3 Theory of Firm (11)

3.1 Non-Collusive Oligopolistic Models of Cournot, Bertrand, Stackelberg, Chamberlin and Sweezy (Kinked Demand Curve)

3.2 Collusive Models of Oligopoly

3.3 Theory of Pricing: Hall and Hitch Full Cost Pricing Principle, LimitP Pricing Principle: Contributions of Bain, Sylos-Labini, Modigliani; Flexible Pricing Models

Unit-4 Input Markets (11)

4.1 Demand and Supply of Inputs: Firm's and Industry's Input Demand Curves

4.2 Monopsony and Discriminating Monopsony in Input Markets

4.3 Monopoly in Input Markets: Unions as Monopolists

4.4 Choice of Optimal Combination of Units

References

1 H.A.J. Green. Consumer Theory, MacMillan, London, 1976
2. G. Debreu. Theory of Value, John Wiley, New York, 1959, Ch.4
3 C.E.Ferguson. The Neo-Classical Theory of production and Distribution, Cambridge University Press, 1969, Chs.1-6
4. L. Johansen. Production Functions, North Holland, London, 1972
5. R.W.Shephard. Theory of Cost and Production Functions, Princeton University Press, N.J., 1970
6. L. Lancaster. Consumer Demand: A New Approach, Columbia University Press, New York, 1972
7. W.J. Baumol. Economic Theory and Operations Analysis, Prentice Hall, 1985
8. A.Deaton and J.Muellbauer. Economics and Consumer Behaviour, Cambridge University Press, 1980
9. P.P.G.Layard. and A.A.Walters. Microeconomic Theory, McGraw Hill, New York, 1978

10. H.Greville and R.Rees. Microeconomics, Longman, London, 1981

11. Koutsoyiannis. Microeconomic Theory, MacMillan, 1980

12. R.M.Cyert and R.March. A Behavioural Theory of Firm, Prentice Hall, Englewood Cliffs, N.J., 1963

13. Henderson, J and Quandtt, R A Microeconomic Theory, McGraw Hill, Tokyo, 1984

ECO 206 PUBLIC ECONOMICS

Unit-I Public Goods and Public Sector (12)

1.1 Public Economic Policy - Allocation, Distribution and Stabilization - Positive and Normative Approach

1.2 The theory of public goods - Demand and Production of public goods, partial and general equilibrium analysis, problem of social choice

1.3 Market failure, externalities and public policy - Externalities and efficiency, Government intervention and externalities, Balancing Distortion - A Pragmatic and Approach towards policy

1.4 A model for public sector analysis - General Equilibrium model, Pareto optimality and perfect competition

Unit-II Public Expenditure and Taxation (11)

2.1 Public Expenditures - Pure theories of public expenditure - Tiebout, Samuelson and Buchanan's Contributions.

2.2 Theories of taxation - Tax neutrality, Direct vs. Indirect taxes and equity, Buoyancy and Elasticity, Tax Efforts.

2.3 India's Tax Structure : Taxation and Economic inequalities, Major Heads of Taxes in India, Direct and Indirect Taxes on income and commodities. Taxes on Property and Wealth.

Unit-III Budgeting and Fiscal Policies (11)

3.1 Program Budgeting : Its application, zero-based budgeting; Budgeting Policies

3.2 Theory of Fiscal Policy : Fiscal Policy with special models, Indian Fiscal Policy. Federal-Fiscal Relation in India.

3.3 International Aspects of Public Economics, Taxation, Tariffs, Taxation of foreign income, Expenditures, Border Tax adjustments -Rationale and Practice, Policy Prescriptions

Unit-IV Evaluation of Public Expenditure (11)

4.1 Project Evaluation- Cost-Benefit Analysis, Measuring Benefits, Market Prices, Shadow Prices, Measuring Costs and the Analysis

4.2 Compensatory Finance

References

Bowers, F.F., Private Choice and Public Welfare, The Dryden Press, New York, 1974.

Hyman, David, N., Public Finance - A Contemporary Application of Theory to Policy, The Dryden Press, New York, 1983

Davie, B.F. and Duncombe, B.F., Public Finance, Holt, Rinehard and Winstreet, New York, 1970.

Jha, Raghbendra, Modern Theory of Public Finance, Wiley Eastern Limited, Delhi, 1987.

Musgrave, Richard A. The Theory of Public Finance, Tata McGraw Hill, N.Y., 1959

Hughton, R.C. (ed.), Public Finance, Penguin Publication.

Prest, A.R. Public Finance in Theory and Practice, Weidenfeld and Nicholson, London, 1975

Macdowell, A. Anderson, J. Richard, Financing State and Local Governments.

Ursula, Hicks, Public Finance, James Nisbet and Co., London, 1968

Frosch, R., Public Sector Economics.

F. Flatters, V. Henderson and P. Mieszkowski, Public Goods Efficiency and Fiscal Equalisation, Journal of Public Economics, vol.3, 1974, pp.99-112.

ECO 207 ECONOMICS OF DEVELOPMENT AND PLANNING

Unit- I

1.1 Concept of Development-Ends Versus Means in the Development Process. Ideology, Politics and Change

1.2 Dualism - Social, Technical and Economic Dualism - The Implications of the Lewis Model, Ranis and Fei Model, Criticism

1.3 Balanced and Unbalanced Growth, Linkage Effect (Hirsch, Nurkse) Big-push Theory (Rosentein-Rodan), Spread and Backward Effects Theory (Myrdal)

Unit-II

2.1 Stage Theories of Development : Neuman Historical School, Marx, Rostow

2.2 Theories of underdevelopment.

2.3 Colin Clark Dependency Theory : Frank, Cundell

Unit-III

3.1 Role of Markets in Socialist and Mixed Economies

3.2 Planning Strategy - Foundations of India's Development Strategy

3.3 India n Plan Models

3.4 Plan performances and Problems related to Plan Implementation

Unit-IV

4.1 Financing Plan; Resource allocation and resource mobilisation

4.2 Micro-Level Planning. Decentralized Planning

4.3 Role of Development Programmes, IRDP, NREP and JRY, etc., CriticalEEvaluation

References

1. Sen, A.K. (ed.), 1971. Growth Economics, Penguin Books, Harmondsworth
2. Higgins,B.,1959.Economic Development,North New New York
3. Myrdal,G.,1957.Economic Theory and Underdeveloped Regions,Duckworth,London.
4. Meir, G. M. (ed), 1984. Leading Issues in Economic Development, Macmillan, London.
5. Thirlwall, A.P.(1975). Growth and Development, Macmillan, London.
6. Kindleberger, C.P., 1977. Economic Development, Mc Graw Hill, New York.
7. Sen, A.K.,1975. Employment, Technology and Development. Oxford University Press, NEW DELHI.
8. Chakravarty, S,1987. Development Planning : The Indian Experience, Calrendon Press, Oxford.
9. Todaro,M.P.,1971. Development Planning : Models and Methods, Oxford University Press, Oxford.
10. Bhagwati, J. and P. Desai, 1970. India : Planning for Industrialisation, Oxford University Press, London.

5:2:3:(17)

ECO308 INTERNATIONAL TRADE

Unit - I Pure Theory of International Trade (11)

1.1 Classical Theory : a) International Economics, Comparative Advantage and theory; b) Adam Smith and Absolute Advantage of Trade; c) Ricardo's Theory of Comparative Advantage; d) Gains from Trade - Ricardo; e) J.S. Mill's Theory of Reciprocal Demand; f) Assumptions of the Classical Theory.

1.2 Supply and Demand in International Trade : a) Gains from trade under constant and increasing opportunity costs optimum production; b) Individual and community indifference curves, equilibrium demand and supply under autarky and trade, Marshall's Theory of Offer Curves, equilibrium relative commodity price under trade.

1.3 Neo-Classical Model of International Trade : a) Heckscher - Ohlin Theorem - views, assumptions, factor abundance in price terms and physical terms; b) Heckscher-Ohlin Theorem and Theory of Comparative Advantage.

Unit-II Effects of International Trade (11)

2.1 Trade and factor prices : a) Factor prices under trade with free mobility of labour, under autarky with immobility of labour, under trade with immobility of labour (factor-price equalization); b) Factor price and complete specialisation.

2.2 Trade and Income Distribution : Gains from trade and the the income distribution.

2.3 Trade and factor Reversals - Leontief Paradox : a) Factor -intensity reversals; b) Factor reversals and specified factor endowments; c) The Leontief Paradox.

2.4 Trade and National Income : a) The import function, average and marginal propensities to import, elasticity of imports; b) equilibrium level of national income, trade multiplier, effects of changes in imports and exports, investment; c) internal and external equilibrium in an openeconomy, aims-means analysis for reaching internal and external equilibrium.

Unit-III Balance of payments and Foreign Exchange Markets (11)

3.1 The Foreign Exchange Market : a) Demand for, and Supply of, Foreign exchange; b) Elasticities of demand for, and supply of, foreign exchange; c) Flexible exchange rates; d) Foreign Exchange Markets - spot and forward markets; premiums and discounts, hedging, interest arbitrage, speculation.

3.2 The Balance of Payment Account : a) Balance of Payment account, Balance of Trade, Balance of Trade, Balance of Current Account; b) Equilibrium and disequilibrium in the Balance of payments; c) Surplus and deficit in the Balance of payments.

3.3 Adjustment Mechanism : a) Indirect machanism - the gold standard and deflation, the flexible exchange rate and depreciation, monetary and fiscal policies and expenditure reducing policies, devaluation and expenditure switching policies; b) Direct machanism - financial controls, commercial controls, capital movement controls.

Unit-IV The Exchange Rate

4.1 International Gold Standard : a) Definition and types of Gold standard; b) Gold Standard mechanism; c) Advantages and disadvantages of the gold standard; d) Operation and collapse of the gold standard; e) Pegged Exchange rates.

4.2 Fixed Versus Flexible Exchange Rates : a) Flexible Exchange Rates, case for and against; b) Fixed Exchange Rates, case and against; c) effect of uncertainty, speculation and inflation on flexible exchange rate.

4.3 The Exchange Rate and the Balance of Payments : a) The Exchange Rate and the Current Account - price elasticities of imports (Marshall-Lerner-Robinson model), nominal and real exchange rates, the absorption approach - optimal policy; flexible exchange rate - its behaviour; b) The Exchange rate, the Capital Account and Expectations - Expectations and Rates of Returns, uncertainity and behaviour towards risk, expectations and exchange rate behaviour, forward markets and interest rates; Determinants of the forward rate - effects in change in foreign interest rate and expectations, forward rate and the spot rate.

References

1. Bo Soderston : International Economics.
2. Miltiades Chacholiades : The Pure Theory of International Trade (H.G.Johnson)
3. R.N.Bhatia : Studies in the Pure Theory of International Trade.
4. American Economic Association : Readings in International Economics.
5. J.Bhagwati (Ed.) : International Trade.
6. H.G.Johnson : International Trade and Economic Growth.
7. M.C.Kemp : The Pure Theory of International Trade
8. C.P.Kindleberger : International Economics
9. P.T.Ellsworth : International Economics
10. G.Haberler : The Theory of International Trade.
11. Peter B.Kenen : The International Economy.
12. H.Robert Heller : International Trade - Theory and Empirical Evidence.
13. P.N.Roy : International Trade - Theory and Practice.

ECO 409 INDIAN ECONOMY

Unit-I (11)

1.1 Indian Economy : Features at Independence, Main Obstacles to Development, Planned Development and Role of State.

1.2 Determination of National Income in India : Flow of Fund Analysis and Problem of Measurements.

1.3 Structural Changes in Indian Economy - Sectoral Analysis

Unit-II (11)

2.1 Analysis of Human Resources in India : Population Structure, Resettlement Patterns, Problems of Population Control.

2.2 Agrarian Structure of Different Regions; Effects of Commercialization and Demographic Change on the Structure of Land Holding, Tenancy and Agricultural Labour.

2.3 Growth of Labour Markets; Trends in the Growth of Wage Labour in Agriculture and Industrial Labour Force.

Unit-III

3.1 Long Term Changes in the Structure, Direction and Composition of Foreign Trade in India

3.2 Balance of Payments Problem, Recent Policy Changes and its Impact on BOP.

3.3 Foreign Aid and External Debt

Unit-IV

4.1 Poverty Incidence and Measurement, Eradication Programme

4.2 Structure of Employment, Nature of Unemployment

4.3 Recent Changes in Industrial Licensing and Trade Policies

References

Bhagwati, J.N. and Desai. Indian Planning for Industrialisation
Pramit Chaudhary, Indian Economy
Pramit Chaudhary (ed.) Aspects of Indian Economic Development
C.D.Wadhwa (ed.) Some problems of India's Economic Policy
R.H. Cassen. India, Population Economy and Society
J.C.Sandesara (ed.) Indian Economy - Performance and Prospects
GOI. Economic Surveys (various issues)
GOI. Draft Eighth Five Year Plan
V.R, Panchmukhi. Trade Policies of India
M.L Dantwala. Understanding Poverty and Unemployment, Indian Merchants Chamber Brochure
Hobsbawm (ed.) Peasants in History. Chapter by V.S. Vyas
Dandekar and Rath. Poverty in India. Indian School of Political Economy 1971
Depak Nayyar. Indian Export Policies in the 1970s. Cambridge University Press 1976
S.B.Gupta. Monetary Planning in India
P.K.Basu and A. Nove (ed.) Public Enterprise Policy on Investment, Pricing and Returns. (1980)
C.T.Kurien. Small Sector in New Industrial Policy. EPW. March 4, 1978.
Raj Krishna. Inter-state Disparities in Economic Development, GL Mehta Memorial Lecture, IIT, Bombay, 1980

ECO 3001 THEORIES OF INDUSTRIAL ECONOMICS

Unit-I (11)

1.1 Introduction and scope of Industrial Economics

1.2 Industrial Efficiency: Concept, determinants, measurement and decision making process.

1.3 Market Structure and Conduct.

1.4 Market concentration and Conduct.

Unit-II (11)

2.1 Types and choice of Organisational Firm.

2.2 The Firm and its objective - Mono profit maximising models.

2.3 Cost Theory and Optimum size of a firm.

2.4 Diversification, Vertical integration and Merger.

Unit-III (11)

3.1 Nature and Types of Investment Decisions: Time Profile, Project Evaluation.

3.2 Social Cost Benefit Analysis.

3.3 Industrial Financing and accounting.

3.4 Analysis of Financial Ratios.

Unit-IV (12)

4.1 Industrial Location Analysis: The Determinants of Industrial Location.

4.2 Social Costs of Industrial Concentration in Metropolis in terms of emergence of slums, pollution and transport Bottlenecks.

4.3 Social benifits and Industrial dispersion.

4.4 Rural industrialisation: Major issues and problems.

References:

Koutsoyiannis A. (1979) Modern micro Economics, 2e, Macmillan NewYork

Clarkson K.W. and R millar (1985) Industrial Organisation: Theory Evidence and public policy, Mcgraw-Hill, Kogakusha, Tokyo.

Hennah L and J Kay (1977) Concentration of Modern Industry, Macmillan, London.

Israd W (1956) Location and Space Economy, Johnwiley, NewYork.

Smith D M (1971) Industrial Location: an Economy and Geographic Analysis, Johnwiley, New York.

Ghosh P K (1977) Government and Industry, Oxford University Press, Delhi.

ECO 3004 STATIC OPTIMIZATION TECHNIQUES

Unit - I Classical Optimization Techniques
(Unconstrained and Constrained) (B)

1.1. Optimization: Nature and Importance in Economic Analysis

1.2 Unconstrained Optimization:Search Methods

1.3 constrained Optimization:Largrangian Technique.

1.4 Applications:Consumer Theory and The Theory of Firms.

Unit-II Constrained Optimization:Extensions (15)

2.1. Global and Local Optima: Weirstrass Theorm

2.2. Extension of largangian Technique: Kuhn-Tucker Theorem, Duality in Kuhn-Tucker Theorem

2.3. Nonlinear Programming:Search Methods

2.4. Quadratic and Geometric Programming and their Applications.

Unit-III Linear Programming and Its Extension (12)

3.1. Linear Programming:Solution of LP with Simplex Method Duality

3.2. Parametric Programming and Sensitivity Analysis

3.3. Integer Programming:Branch and Bound and Cutting Place Methods

3.4. Applications: Activity analysis, Theory of Games and Input-Output Analysis

Unit-IV Stochastic Programming (10)

4.1. Stochastic Linear Programming: Chance Constraints

4.2. Stochastic Non-linear Programming:Chance Sonstraints

4.3. Applications to Inventory Models

References:

1. Panik,M.J.:Classical Optimization:Foundations and Extensions, North Holland Pub.Inc.,Amsterdam,(1982).

2. Baumol, W.J.:Economic Theory and Operations Analysis,Prentice Hall, N.Delhi,(1977)

3. Rao,S.S.: Optimization:Theory and Applications,Wiley Eastern,N.Delhi, (1984).

Contd/.../-

4. Koopman,T.: Activity Analysis in Production and Allocation, Wiley N.Y.(1951)

5. Dorfman,R.et.al.:Linear Programming and Economic Analysis,McGraw Hill, Tokyo,(1958)

6. Hadley,G.: Linear Programming,Addison Weseley,N.Y.(1962)

7. Hadley,G.: Non-linear Programming,Addison Weseley,N.Y.(1962)

8. Wagner,H.M.: Principles of Operations Research,Prentice Hall, New Delhi,(1969)

9. Intriligator,M.D.: Mathematical Optimization and Economic Theory, McGraw Hill,N.Y.,(1977).

10. Gass,S.I.:Linear Programming,McGraw Hill,Tokyo,(1975).

11. Balakrishnan,A.V. and Thoma,M.(Ed): Optimization Techniques Part I and II,Springer Verlag,Berlin,(1978).

ECO 4001 INDUSTRIAL ORGANIZATION IN INDIA

UNIT I (11)

1.1 Industrialisation: Rationale,Objectives, Strategies and Polities.

1.2 Industrilisation in India and State promotion of Industries.

1.3 Evaluation of Industrial process during five year plans.

1.4 Large and small scale industries.Importance of small scale industries in the Indian economy.

UNIT II (11)

2.1 Concept and choice of technology. Appropriate technolgy.

2.2 The theory of technological innovation and diffusion of new technology.

2.3 Labour productivity and Wage determination.

2.4 Empirical analysis of labour productivity.

UNIT III (11)

3.1 Industrial Licensing Policy of early 1970's.

3.2 Indian Industrial policy:Issues and evaluation.

3.3 Monopolistic and Restrictive Trade Practices Commission.

3.4 Recent trends of liberalising Indian economy.

Contd/.../-

UNIT IV (12)

4.1 Public sectors: Role and performance.

4.2 Growth of Public sectors in Indian economy.

4.3 pricing in public sectors.

4.4 Importance and challenges for public sectors in changing scene of Indian economy.

References:

Ahluwalia I J(1985) Industrial Growth in India,Oxford University Press,Delhi

Dhar P N and H F Lydall (1961) The role of small enterprises in Indian economic development,Asia publishing press,Bombay.

Sandesra J C (1980) Small Industry in India: Evidence and interpretation, Lal Lajpat Rai College,Bombay.

Gupta L C (1969) The Changing Structure of Industrial finance in India, Oxford University Press.

Khan M Y (1981) Indian Financial System, Allied Publishers,New Delhi.

Godbole M D (1978) Industrial Dispersal Policies, Allied Publishers,Bombay.

ECO 4002 ENVIRONMENTAL ECONOMICS (12)

UNIT I

1. Theory and Concepts

1.1 Scope and components of Environmental Economics.

1.2 Environment and Economic process.

1.3 Environmental Quality as public good.

1.4 Environment and Development.

UNIT II

2 Environmental Problems (11)

2.1 Environmental trends in developed and developing Countries.

2.2 Environmental pollution:Air and Water pollution.

2.3 Land use, Deforestation,Urbanisation and its impact on environment.

2.4 Environmental costs of economic growth.Limits to growth.

Contd/.../-

UNIT III (11)

3. Issues on Environmental Protection

3.1 Man and Eco-system

3.2 Planning: Ecodevelopment Approach, Eco strategies and eco techniques

3.3 Modeling eco-development.

3.4 Conservation of Natural Resources.

UNIT IV

4. Policy and Administration: Implementing Eco-development

4.1 Regulation and affluent fees.

4.2 International Environmental policy.

4.3 Laws and Environmental protection in India

4.4 Administration of Eco-development.

References:

Arvill, Robert (1983) Man and Environment, Penguin Books.

Bohm, Peter and Allen V. Kneese (1971) Economics of Environment, Macmillan.

Chand, Attar (1985) Environmental Challenges, UDH Publishers, Delhi.

Dasgupta, artha (1982) The Control of Resources, Oxford University Press, Delhi.

Dorfman, Robert and Nancy Robert (1977) Economics of Environment: Selected Reading, W. W. Nortan and Company.

Fisher, Antony C (1981) Resource and environmental Economics, Cambridge University Press.

Hillary, E (1984) Ecology-2000: The changing face of earth, (ed) Machael Joseph, London.

Mahbub ul Haq (1983) Poverty Curtain, Oxfoed University Press, Delhi.

Meadows, D W (1973) Limits to Growth, Universe books, New York. Mills, E S Economic Analysis of environmental Problems.

Pearce D W (1972) Environmental Economics, Longman, London.

------ and kerry R Turner (1989) Economics of Natural Resources and Environment, Harvester Wheatsheaf, New York.

Singh and Shekar (1984) Environmental Policy in India, (ed) IIPA, Delhi.

Tewari D N (1987) Victims of environmental crisis, EBD Educational Pvt Ltd.

Contd/.../-

Vakil Arun C (1984) Economic Aspects of Environmental Pollution in India.

Articles:

Baumol W.J(1972) On Taxation and Control of Externalities, American Economic Review,62,June.

Coase,Ronald (1960) The Problems of Social Cost,Journal of Law and Economics,Oct.

Ehrlich P R and A N Ehrlich (1988) Population,Plenty and Poverty,National Geographic,Dec.

Hadder G S (1987) Statutes and standards for Pollution Control in India, Economic and Political Weekly,Vol XXII, no16,April 108.

Tisdell C ( ) Sustainable Development: Differing Perspective on Ecologists and Economists and relevance to LDCs,World Development,Vol-16,No3.

ECO 4003 MODERN GROWTH ECONOMICS

Unit I Elements of Growth Theory (8)

1.1 Growth Theory:Nature,Scope;Dynamic Analysis of Economic Modles

1.2 Time Path Solution: Properties,Existence and Stability;

1.3 Problem of Aggregation and Growth Theory.

1.4 Production Function in Growth Theory: Dynamic Production Relation and their properties.

Unit II One Sector Growth Models (10)

2.1 Review of Basic Growth Models:Harrod-Domar and Neo-Classical Growth Models

2.2 Balanced Growth Path:Existence,Uniqueness and Stability

2.3 Extensions of the Basic Models:Models of Sato,Samuelson and Eisner.

2.4 Vintage Capital Goods Models

2.5 Savings Behaviour and Grwoth Models:Savings by Age Group and Social Classes,Capital Gains and Models based on them.

Unit III Technical Progress and One Sector Models (12)

3.1 Role of Technical Progress in Growth Models:Single Tech.Change.

3.2 Neutral Technical Progress:Harrod,Salow and Hicks.

3.3 Effects of Technical Progress:Shifts in Production Function,The Problem of Measurement.

3.4 Technological Progress and Growth:Inducement and Experience.

Contd/.../-

Unit IV Extension of Growth Models and Optimal Growth (12)

4.1 Money in the growth Models:Johnson and Tobin Models

4.2 Disaggregated Growth Models:Meade and Uzawa

4.3 Optimal Growth Models:Ramsey and Von Neumann

4.4 Optimal Growth:Turnpike Theorems and Relative Stability

Reference:

1. Sen, A.K.(Ed.): Growth Economics, Penguin Books, Hamondswurth,(1970).
2. Wan,H.Y.: Growth Economics,HBJ Publishers, Amsterdam,(1976).
3. Neher,P.A.: Economic Growth and Development,John Wiley and Sons,New York, (1971).
4. Harrod,R.F.: Towards Dynamic Economics,Macmillan,N.Y.,(1956).
5. Johnson,H.G.:Essays in Monetary Economics,Allen and Unwin,New Delhi,(1967)
6. Baumol,W.J.:Economic Dynamics,Macmillan,N.Y.,(1970).
7. Takayama,A.:Mathematical Economics,Dryden Press,(1974).
8. Tobin,J.: Money and Economic Growth,Econometrica,Vol. 33,(1965)
9. Jones,H.G.:An Introduction to Modern Theories of Economic Growth McGraw Hill,Tokyo,(1976).
10. Allen,R.G.D.:Macroeconomic Theory:A Mathematical Approach,Macmillan, London,(1968)

ECO 4004 DYNAMIC OPTIMIZATION TECHNIQUES

Unit-I Dynamic Programming (8)

1.1. Analysis of Dynamic Phenomenon:Nature and Scope

1.2 Bellman's Principle of Optimality:Numerical Solutions

1.3 Application

Unit-II Calculus of variation (15)

2.1 Functionals and their variations

2.2 Optimization with Functionals:Necessary Condition- The Euler's Equation and its Generalization

2.3. Boundary Conditions in Variational Problems.

2.4. Second Variation and Sufficient Conditions:The Legandre and Jacobi Conditions,Weirstrass Condition for Strong extrema,Legandre-Clebsch Conditions.

Contd/.../-

Unit-III Application of Calculus of Variation in Economic Problems (8)

3.1 Dynamic Utility, Dynamic Pure Competition and Monopoly

3.2 Dynamic Capital Accumulation

3.3 Dynamic Capital Theory, Capital Theory with Exhaustible Resources

3.4 Optimal Economic Growth: Ramsey's Theory of Savings and von Neumann Model.

Unit-IV Optimal Control (12)

4.1 Calculus of variation and Optimal Control: Pontryagin's Maximum Principle.

4.2 Transversality Conditions, Second variation and Sufficient conditions

4.3 Constrained Optimal Control Problem: Equality and Inequality Constraints

4.4 Applications to Problems in Economics: Optimal Growth-Rehman's Principle of Allocation, Optimal Non-Renewable Resources, Optimal Population

References:

1. Bellman, R.E.: Dynamic Programming, Princeton U.P., (1957)

2. Bellman, R.E. and Dreyfus, S E.: Applied Dynamic Programming, PrincetonU.P., (1962)

3. Wagner, H.M.: Principles of Operational Research, Prentice Hall, Englewood Cliffs, N.J. (1969)

4. Optimer, S.L. (Ed.); Systems Analysis, Penguin Books, Harmonds Worth, (1973).

5. Hadley, G. and Kemp, M.C.: Variational Methods in Economics, North Holland, Amsterdam, (1971).

6. Elsgolts, L.: Differential Equations and Calculus of Variation, Mir Pub., Moscow, (1980).

7. Smith, D.R.: Variational Methods in Optimization, Prentice Hall, Englewood Cliffs, (1974).

8. Tu, P.N.V.: Introductory Optimization Dynamics, Springer Verlang, Berlin, (1984).

9. Chow, G.C.: Analysis and Control of Dynamic Economic Systems, John Wiley, N.Y., (1975).

10. Takayama, A.: Mathematical Economics, Dryden Press, N.Y. (1974)

11. Balakrishnan, A.V. and Thoma, M. (Ed.): Optimization Techniques Part I and II, Springer Verlag, Berlin, (1978).

Contd/.../-

ECO INTERNATIONAL ECONOMICS

Unit - I Trade, Growth and Imperfect Competition (11)

1.1 Trade and Increase in Factor Endowments:(a) The Rybczynski Theorem; (b) Terms of trade and factor growth.

1.2 Trade and Technical Progress: a) Neutral Technical Progress;b) Capital-saving Technical Progress; c) Labour-saving Technical Progress.

1.3 Trade and Imperfect Competition;a) Monopolised National Markets and trade - equilibrium,reaction curves and their shifts,effects of export subsidies and their analysis; b) Trade and Monopolistic Competition - equilibrium; c) Empirical works.

Unit -II Trade and Policy Prescriptions (11)

2.1 Theory of Tariffs: a) Effects of tariffs on commodity Prices, production,consumption and imports; b) Tariffs and their effects on the income distribution - Stolper-Samuelson Theorem;c)Tariffs terms of trade,domestic prices d) The optimum tariff.

2.2 Quotas and Quantitative Restrictions: a) Effects of Quotas; b) Direct Controls;c) State Trading-monopolies.

2.3 State Trading Monopolies:a) Forms and objectives ;b) Merits and Demerits

2.4 Theory of Customs Unions: a) Trade creation and diversion; b) Production ofcommodities; c) Production and Consumption effects of Customs Unions; d) Other dynamic effects of Customs Unions.

Unit-III International Trade:Extended Theory (11)

3.1 Factor Substitution and a modified Ricardian Model :a) Factor Prices and Factor Substitution - employment,b) the Ricardian Model modified - relative prices, the Haberler Theorem,factor supplies and the production possibility curve and trade; c) Growth in the modified Ricardian Model- effect on output and real earnings, effect on terms of trade, and effect on gains from trade.

3.2 Factor Substitution and a modified Heckscher-Ohlin Model :a) Factor substitution, capital allocation,equilibrium in factor market; b the Heckscher-Ohlin Model modified;c) Heckscher-Ohlin model and growth- the Rybzynski and Stolper-Samuelson theorem applied, economic efficiency,

Contd/.../-

3.3 Modern Theories of International Trade: a)Vent-for-Surplus Approach:b) Availability Approach - I.B.Kravis; c)Monopolistic Competition and Trade; d) Increasing Returnsto Scale and Trade; e) Other technological explanations.

Unit-IV International Monetary and Trade Organisations (12)

4.1 International Monetary Fund(IMF):a) Background;b) Objective of IMF; c) Operation of IMF;d)The IMF and the future of the international monetary system; e)Special Drawing Rights(SDR)-international liquidity.

4.2 World Bank and its affiliates : a) International Bank for Reconstruction and Development (IBRD);b) International Finance Corporation (IFC); c) International Development Association.

4.3 Political Economy of International Trade : a) History of tariffs in USA and Europe,the decline and collapse of freetrade; b) Trade liberalization - universal approach and General Agreement on Trade and Tariffs (GATT),regional approach and Europeon Economic Community (EEC),the Kennedy Round,Tokyo Round; c) Retreat from Liberalization-protectionism and import competition, assistance to trade adjustments; d) Trade and economic development-United Nations Conference on Trade and Development(UNCTAD) and International Trade Centre (ITC); e) Other issues - growing use of quotas, subsidies and dumping, trade and agricultural production, trade and services.

References

1. Bo Sodersten : International Economics.
2. Miltiades Chacholiades : The Pure Theory of International Trade (H.G.Johnson)
3. R.N.Bhatia : Studies in the Pure Theory of International Trade.
4. American Economics Association : Readings in International Economics.
5. J.Bhagwati(Ed.) : International Trade.
6. H.G.Johnson : International Trade and Economic Growth.

Contd/.../-

7. M.C.Kempt : The Pure Theory of International Trade

8. C.P.Kindleberger : International Economics.

9. P.T. Ellsworth : International Economics.

10. G.Haberler : The Theory of International Trade.

11. Peter B.Kenen : The International Economy.

12. H.Robert Heller : International Trade - Theory and Empirical Evidence.

13. P.N.Roy : International Trade - Theory and Practice.

14. Rajit Sau (1978) : Unequal Exchange, Imperialism and Underdevelopment:An Essay on the Political Economy of World Capitalism(Oxford University Press, Calcutta)

ECO 3106 ECONOMICS OF AGRICULTURE I

Unit I Statistical and Physical Resource Base

1.1 Land Use Pattern and Agro-Climatic Zones
Natural Resources(land, Labour,Forests and Water)

1.2 Date Base:Crop and Livestock Coverage;Statistical Machinery

1.4 Farm Surveys and Census Data:Agricultural and livestock Census Reports.

Unit II Institutional Factors

2.1 Tenancy in Agriculture:Types, Incidence and Effects on crop

2.2 Land Reforms:Scope and Evaluation

2.3 Mode of Production

2.4 State Policy Towards Agriculture (Indian Case)

Unit- III Agriculture Wages and Prices

3.1 Growth in Landless Labour:Causes and Implications

3.2 Growth and Trends in Agricultural Wages.

3.3 Trends in Prices

Unit-IV Micro Theory of Farm-Firm

4.1 Production and Profit Function Approach : Measurement of the Rate and Bias of Technological Change in Agriculture

4.2 Decomposition of Agricultural Growth in India

4.3 The Treatment of Farmer's Behaviour under Risk and Uncertainty

4.4 Benefit Cost Analysis of Agricultural Projects.

Contd/.../-

REFERENCES

1. Government of India, Indian Agricultural Statistics, Vol.I & II, Ministry of Agriculture, New Delhi(From 1948-49 to 1989-90)

2. Bansil, P.C. (1990), Data Base for Indian Economy - Agricultural Statistics, New Delhi.

3. Rao, C.R. (1975), Data Base of Indian Economy, ISI, New Delhi

4. Schultz, T.W. (1970), Transforming Traditional Agriculture, Yale University, New Heaven, USA

5. Thorner, A. (1982), Semi-Feudalism or capitalism ? Contemporary debate on Classes and Modes of Production in India, EPW, December 4.

6. Bhaduri, A. (19773), A study in agricultural backwardness under semi-feudalism, Economic Journal, March. Alo June(1979) issue of the same Journal.

7. Bhaduri, A. (1984), The economic structure of backward agriculture, OUP, New Delhi.

8. Basu, K. (1984), Less Developed Economy: A critique of contemporary theory, OUP, New Delhi.

9. Khusro, A. (1965) (ed) Readings in Agricultural Economics, Allied Publishers, Bombay.

10. Alvi, Hamza (1975), Indian and the Colonial Mode of Production, EPW, Special Number, August.

11. Cleaver, H. (1976), Internationalisation of Capital and Mode of Production in Agriculture, EPW, March.

12. Bardhan, P.K. Variations in the Extent and Forms of Agricultural Tenancy, EPW, September 11, 1976.

13. Bardhan, P.K. (1986), Land, Labour and Poverty, Oxford University Press, New Delhi.

14. Kadekodi, Gopal and Murthy, G.V.S.N. (1992) Poverty in India edited Papers in the Seminar organised by the Indian Econometric Society, Vikas Publishers, New Delhi.

15. Sankhayan, P.L. 1988). Introduction to the Economic of Agricultural Production, Prentice Hall of India, New Delhi.

16. Heady, E.O. (1961 , Economics of Agricultural Production and Resource Use, Prentice Hall, Englewood Cliff, USA.

Contd/.../-

17. Heady, E.O. and Dillon J.(1961), Agricultural Production Functions, Kalyani Publishers, Ludhiana.

18. Sagar, Vidhya (1980). Decomposition of Growth Trends and Certain Issues, Indian Journal of Agricultural Economics, April-June.

19. Minhas, B.S. and Vaidhyanathan, A.(1965). Growth of Crop Output in India, 1951-54 to 1958-61 : An Analysis by Component Elements, Journal of the India Society of Agricutural Statistics, December.

20. Lalwani, Mahesh (1989). Decomposition and Distribution of Output Gains in India's Dairy Farm Sector, Indian Journal of Agricultural Economics, Jan.-March, pp.55-66.

21. Lalwani, Mahesh (1990), Employment Gains of Technological Change in India's Dairy Farming Sector: Study of Haryana, India Journal of Agricultural Economics, April-June.

ECO 4206 ECONOMICS OF AGRICULTURE II

Unit-II Agricultural Output

1.1 Trends in the Growth and Composition of Crop (Regional and Inter-personal Disparities).

1.2 Supply Response Estimates and Marketed Surplus Relationships

1.3 Marketing Structure : Regulations, Margins, Procurement and Public Distribution Policy (Food grains)

1.4 Agricultural Price Policy of the GOI and Long Term Price Movements

Unit-II Agricultural Inputs

2.1 Demand and Supply of Basic Inputs : Land, Water, Fertilizers, HYV Seeds, Fodder, Livestock.

2.2 Demand and Supply of Agricultural Credit (Regional and Inter-Personal Dimensions); Structure of Institutional Credit (Role of NABARD as an Apex Bank)

2.3 Allocative Efficiency of Inputs in Indian Agriculture (Farm size and Allocative Efficiency Debate)

2.4 Agricultural Productivity, Farm Size and Returns to Scale in Indian Agriculture

Unit-III Savings and Investment in Indian Agriculture

3.1 Agricultural Planning and Public Investment in Indian Agriculture (Rate of Return and Regional Disparities)

3.2 Rural Household Savings and Asset Formation

3.3 Intersectoral Capital Flows

3.4 Agricultural Taxation and Subsidies

Contd/.../-

Unit:IV Trade in Agricultural Commodities (Domestic and World)

4.1 Terms of Trade (Between Indian Agriculture and Rest of the World; Between Indian Agriculture and Indian Mamufacturing)

4.2 Place of Indian Agriculture in the World Trade (Including Agro-based Industries)

4.3 International Assistance for Agricultural Development

4.4 World Level Commodity Agreements : Their Effects on Indian Agriculture.

References

1. C.H.H.Hanumanta Rao (1965), Agricultural Production Functions, Costs and Returns in India, Asia Publishing House,Bombay.

2. C.H.H. Hanumanta Rao (1975),Technological Change and Distribution of Gains in Indian Agriculture,Macmillan, New Delhi.

3. Saini,G.R.(1978).Farm Size,Resource Use Efficiency and Income Distribution,Allied Publishers,New Delhi.

4. Lalwani,Mahesh (1991),Resource Use Efficiency:Experience of Dairy Farmers,Social Action,April-June,1991.

5. Chatopadhyaya,and Rudra,Ashok(1976).Size Productivity Revisited, EPW,September.

6. Mitra,A.(1977), Terms of Trade and Class Relations,Frank Crass, London.

7. Bhardwaj,K. 1974),Production Conditions in Indian Agriculture, Cambridge University Press, Cambridge.

8. Dharam Narain 1961). Distribution of the Marketable Surplus of Agricultural Production by Size Holding in India, 1950-51,Asia Publishing House,Bombay.

9. Raj Krishna 1965),The marketable Surplus Function for Subsistence Agriculture,Economic Weekly,February.

10. Raj Krishna 1965),Farm Supply Response in India-Pakistan : A Case Study , Economic Journal,September.

11. Gandhi,Ved,P.(1970),Aspects of India's Tax Structure,Vobra & Co.,Bombay.

Contd/.../-

12. Subbarao,K.and De Janvry (1986), Agricultural Price Policy and Income Distribution in India,OUP,New Delhi.

13. S.Sawant (1978).Supply Behaviour in Agriculture,An Econometric Analysis,Himalaya Publishing House,Bombay.

14. Mishra,S.N.(1984).Rural Development Planning,Stavahan,New Delhi.

15. Ashok Rudra (1982),Indian Agricultural Economics: Myths and Reality,Allied Publishers,New Delhi.

16. Nabard (1987), Role of NABARD

17. Nayyar,D.(1976),India's Exports and Export Policies in the 1960s, Cambridge University Press,Cambridge.

18. Wadhwa,C.(1977),Some Problems of India's Economic Policy,Tata McGraw,Delhi.

19. Hayami,Y.and Ruttan(1971) Agricultural Development :An International Perspective,Johns Hopkins University Press,USA.

20. Ishikawa,S.(1981),Essays on Technology,Employment, and Institutions in Economic Development: Comparative Asian Experience,Kinokuniya Co., Tokyo.

21. Barbien,P.I.(1984),Inverse Relationships between Farm Size and Land Productivity: A Product of Science or Imagination,EPW,Dec.22-29.

22. Chedha,G.K.(1976), Tenancy System and Agricultural Productivity- A Case Study of the Punjab (India),Social Sciences Research Journal, July-December.

23. Chedha,G.K.(1984),.Farm Size and Productivity Revisited:Some Notes from Recent Experience of Punjab,EPW,September,pp.A87-96.

ECO 3107 ECONOMETRICS -I

(Theory of Econometrics)

Unit-I (11

1.1 Theory of Estimation

1.2 Linear Regression Model:Gauss,Markov Theorem(OLS, ML)BLUE Estimator

1.3 MAD & Recursive Estimation

1.4 Non-Linear Regression

Contd/.../-

Unit-II (11)

2.1 Violation of Gauss Markov Conditions and Problems

2.2 GLS:Solution in Heteroskedastic and Autoregressive Cases

2.3 Distributed Lag Models.

2.4 Multi-collinearity and its Solution

2.5 Stochastic Regressors and Instrumental Variable Method

Unit-III (11)

3.1 Time Series Analysis:Yule-Slutsky Theorem-Periodogram and Correlogram Analyses

3.2 Regression in Sinusoidal Regressors.

3.3 Principal Components-Derivation and Properties

3.4 Discriminant Analysis and Statistical Classification

Unit-IV (12)

4.1 Qualitative Variables in Regression Analysis

4.2 Stochastic Coefficients in Regression Analysis

4.3 Simulation of Single Equation Model and Monte-Carlo Studies

4.4 Estimation of Regression Coefficients under Constraints

References

1. J.Johnston :Econometric Methods,McGraw Hill,Singapore,(1984)
2. J.Kmenta:Elements of Econometrics,Macmillan,N.Y.,(1971)
3. H.Theil:Principles of Econometrics,J. Wiley,N.Y.,(1971)
4. M.Intriligator:Econometric Models,Techniques and Applications, McGraw Hill,N.Y.,(1977).
5. M.G.Kendall:Advanced Theory of Statistics,Vol.III,Charles Griffin,London,(1968).
6. M.D.Intriligator and Z. Griliches:Handbook of Econometrics, Vol.I & II,North Holland,Amsterdam,(1983).
7. S.Goldfeld and R.Quandt:Nonlinear Methods in Econometrics, North Holland,Amsterdam,(1972).
8. G.Judge et.al.:The Theory and Practice of Econometrics,Wiley, N.Y.(1980)

Contd/.../-

ECO 4207 ECONOMETRICS -II

(Multi-equation theory and Applied Econometrics)

UNIT -I (11)

1.1 Concept of Multiequation Modeling Diagonal, Recursive and Simultaneous Models, Block Diagonality OLS Bias in Estimation

1.2 Identification-Necessary and Sufficient Conditions, Exactly Identified Equations and Indirect Least Squares, Reduced, Structural and Final Forms of Estimation

1.3 Estimation of Overidentified Equation: Two Stage Least Squares and LIML Estimators, K-class Estimators.

1.4 Monte-Carlo Findings on Single Equation Estimation

UNIT -II (11)

2.1 Errors Correlated Across Equations and Motivation to Simultaneous Solution of Multiequation Models

2.2 Three Stage Least Squares: Derivation, Estimation and Properties, Zellner's SURE Method.

2.3 FIML Method - Derivation, Estimation and Properties

2.4 Monte Carlo Experiments on Simultaneous Estimation of Multiequation Models.

UNIT - III (11)

3.1 Application of Single Equation Techniques in Production and Consumption Function

3.2 Measurement of Inequality

3.3 Estimation and Demand for Supply of Money

3.4 Phillips Curve and Estimation

UNIT-IV (12)

4.1 Analysis of Dynamic Econometric Models

4.2 Formation of Different Equations in Econometric Models

4.3 Formation of Differential Equation in Econometric Models

4.4 Dynamic Programming and Control

References:

1. J.Johnston: Econometric Methods, McGraw Hill, Sigapore, (1984)

2. J.Kmenta : Elements of Econometrics, Macmillan, N.Y., (1971)

3. H.Theil : Principles of Econometrics, J. Wiley, N.Y., (1971)

Contd/.../-

4. M.Intriligator : Econometric Models, Techniques and Applications, McGraw Hill,N.Y.,(1977).

5. M.G.Kendall : Advanced Theory of Statistics,Vol.III,Charles Griffin, London,(1968).

6. M.D. Intrilegator and Z.Griliches:Handbook of Econometrics, Vol.I & II,North Holland,Amsterdam,(1983).

7. M.D.Intrilegator and Z.Griliches:Handbook of Econometrics,Vol.III, North Holland,Amsterdam(1986).

8. L.R.Klein : Introduction to Econometrics, Prentice Hall N.Delhi,(1973)

9. G.Gordon & L.R.Klein: Readings in Business Cycle,Allen and Unwin,N.W. (1970).

10. D.Laidler:Demand for Money:Theories and Evidence,Harper and Row,N.Y., (1977).

ECO 4307 ECONOMETRICS-III

(Multi-equation Models and Macroeconometric Modeling)

Unit-I (11)

1.1 Multiequation Models,and Methods of Estimation

1.2 Identification,Reduced form,Structural Form and Final Form

1.3 2SLS and 3SLS Estimation

1.4 Macroeconometric Models:Nature and Scope,Historical Development

UNIT-II Forecasting (11)

2.1 Short-term and Long-term

2.2 Impact and Interim Multipliers

2.3 Accuracy:Theil's Coefficient of Inequality

2.4 Other Measures of Accuracy

UNIT-III Policy Evaluation (11)

3.1 Target Instrumental Method

3.2 Social Welfare and Preference Function of Theil and Frisch

3.3 Simulation Methods

3.4 Policy Evaluation with Simulation Techniques

Contd/.../-

UNIT-IV - Critical Evaluation of Major Econometric Models (11)

4.1 Klein's Model and Klein-Goldberger Model

4.2 Wharton School and DRI Models

4.3 Problems of Econometric Modeling in Developing Countries

4.4 Indian Econometric Models

References:

1. Intriligator,M.D.,Frontiers of Quantitative Economics,North Holland Publishing,Amsterdam (1971).
2. Gordon,R.and Klein,L.:Readings in Business Cycle,Allen and Unqin, N.Y.,(1970).
3. Theil,H.: Principles of Econometrics,J. Wiley,N.Y.(1971)
4. Fromm,G.and Taubman,P.J.:Policy Simulations with an Econometric Models,North Holland Publishing, Amsterdam,(1968).
5. Klein,L.R. and Goldberger,A.S.: An Econometric Model of United States 1929-52,North Holland Amsterdam,(1968)
6. Narasimham,N.V.A.:Short-term Planning Model for India,North Holland, Amsterdam,(1956).
7. Pani,P.K.:A Macroeconometric Model for India,Macmillan,N.Delhi,(1977).
8. Srivastava,D.K.: "Policy Simulation with a Macroeconomic Model of the Indian Economy", Journal of Policy Modeling,Vol.4,(1981).
9. Indian Economic Review,Vol.19,No.1,1984 (various articles)
10. Ahluwalia,I.J.:Behavior of Outputs and Prices in India: A Macroeconomic Approach,Macmillan,N.Delhi,(1979)
11. Griliches,Z.and Intriligator,M.D.: Handbook of Econometrics,Vol.III, N.H.,Amsterdam,(1986).

ECO 3115 MONETARY ECONOMICS - I

Unit-I Classical and Keynesian Monetary Theory (11)

1.1 Real and Monetary Sectors;Dichotomy-Neutrality of Money and Real Balance Effect.

1.2 Quantity Theory of Money.Demand for Money-Classical and Keynesian Approach.

1.3 Complete Keynesian Model and Liquidity Preference as a Theory of Interest.

Contd/.../-

Unit-II Demand for Supply of Money (11)

2.1 Demand for Money-Neo-Keynesian Portfolio Approach-Capital Theory applied to Transaction Demand for Money(Baumol-Tobin Model). Friedman's Demand for Money Function.

2.2 Supply of Money-Definitions-Liquidity-Creation of Money by Bank. Endogeneity and Exogeneity of Money Supply.

2.3 "High Powered Money" - Central Bank and Controlling Mechanism. Monetary Theory of Price Level.

Unit-III Monetary Institutions and Economic Growth in LDCs' (11)

3.1 The changing pattern of Monetary Markets in LDCs

3.2 Banking and Non-Banking Financial Intermediaries; Gurley+Shaw Model; Security Differentiation and Diversification

3.3 Money and Economic Growth.

Unit-IV Monetary Planning and Policy with Reference to India (12)

4.1 Objectives of Monetary Planning. Neutral Money. Planned Control of Money Supply.

4.2 Proportionality of Money and Prices. Neutrality and Causality of Money.

4.3 Monetarists and Structuralists View Points - The Debate.

References

Arrow, Kenneth,J., Essays in the Theory of Risk Bearing, Amsterdam, North-Holland, 1971.

Aschheim, Josepth, Techniques of Monetary Control, Baltimore Johns Hopkins, 1961.

Basu, S.K., A Review of Current Banking Theory and Practice, New Delhi, Macmillan, 1976.

Friedman, M., Quantity Theory of Money - A Restatement, in Walters, A.(ed) Money and Banking, Penguin Modern Economic Readings; Harmondsworth, 1973.

Ganguly, S., A Treatise on Banking and International Monetary Management, Moalik Library, 8-D, Ramnath Mazumdar Street, Calcutta.

Coats, Warren L. & Khatkhate, Deena, Money and Monetary Policy in Developing Countries - A Survey of Issues and Evidences, Pergamon Press.

Contd/.../-

Gupta,Suraj,B. The Portfolio Balance Theory of the Expected Rate of Charge of Prices, Review of Economic Studies,Vol.37,No.2,1970.

Gupta,Suraj B.Monetary Planning in India,New Delhi,Oxford University Press,1981.

Gurley,J.G.and Shaw,E.S.,Money in a Theory of Finance,Washington D.C., The Brookings Institution,1960.

Modigliani,F., Liquidity Preference, and the theory of Interest and Money in Lutz.F.A. and Minists,L.W.(eds.),Readings in Monetary Theory Philadelphia,1951.

Patinkin,Don.Money,Interests and Prices,New York,Harper and Row,1965.

Pantinkin,Don,Studies in Monetary Economics,New York, Harper and Row,1972.

Johnson,Harry,G.,Essays in Monetary Economics,London,George Allen and Unwin 1969.

Johnson,Harry,G.,Selected Essays in Monetary Economics,London,George Allen and Unwin,1978.

Laidler,D.E.W.,The Demand for Money:Theories and Evidence,Bombay,Allied, 1972.

Prasad,K., The role of Money Supply in a Developing Economy,New Delhi, Allied,1969.

Tobin,J.,Money and Economic Growth,Econometrica,XXXIII,pp.671-84,October,1965.

Clower,R.M.(ed),Monetary Theory,Penguin Modern Economics Readings, Harmondsworth,1973.

ECO 4215 - MONETARY ECONOMICS-II

Unit-I Financial System (11)

1.1 Flow of Fund Analysis-Monetarist and Keynesian Approach

1.2 Credit and the Financial System-Financial Markets :Money Markets and Capital Markets;Financial Institutions - Banks and Non-Banks Financial Intermediary(NBFI)

1.3 Structure and Growth of Indian Financial System since 1950s: Sectoral distribution of Savings and Capital Formation.

1.4 Finance and the Real Capital Stock.

Contd/.../-

Unit-II Financial Development and Economic Growth (11)

2.1 Commercial Banks : Concept of Credit Creation -Changing Theories of Commercial Banking; Bank Nationalization, Rationale and Review, Resource Base and Portfolio Management of Commercial Banks

2.2 Co-operative Banks and their Structure; Development Banks; NBFLs and their types; Mutual Funds - their emergence and importance

2.3 Promotion of Banking Habit and Economic Development- Growth of 'real" and monetary variables.

Unit-III Monetary Regulation Measures (11)

3.1 Goals, Targets and Constraints of Monetary Policy

3.2 Instruments of Monetary Regulation : Quantitative including CRR and SLR etc. and Qualitative; Trade-offs in usuing different instruments of Monetary Regulation.

3.3 The Approach to Monetary Expansion in India: The 1951-69 experience Post-1969 Scenario

Unit-IV Issues and Evidence (12)

4.1 Relationship between Money, Output and Prices, RBI credit to Government and Deficit Financing.

4.2 Centralised economic system vs market system - the relative importance and role of financial sector; role of domestic monetary policies in the context of global economic and financial integration.

4.3 Financial Reforms and liberalisation - Review of the Chakravarty and Narasimham Committee Reports.

References

Pai Panandikar, P.H., 1973, Interest Rates and Flow of Funds - A Case Study; India (Macmillan)

Gowland, David, 1985, Money, Inflation and Unemployment- The Role of Money in the Economy, (Wheatsheaf Books, Hanester Press)

Clayfon, G., Gilbert, J.C. & Sedgwick, R. (eds.), 1971 Monetary Theory and Monetary Policy in the 1970s (Oxford University Press), 1971.

Contd/.../-

R.B.I,1985,Report of the Committee to Review the Working of the Monetary System (Chakravarty Committee Report),RBI,Bombay,1985.

R.B.I., Bulletin,1968, Pattern of Ownership of Government Debt.

Sinha, S.L.N.(ed.), 1973,Reform of the Indian Banking System,Orient Longman,1973.

Goldfield, S.M.,1966,Commercial Bank Behaviour and Economic Activity, North-Holland.

Coats, Warren and Khatkhate, Deena,1991, Money and Monetary Policy in LDCs in the 1990s,(in EPW,June,22).

Coats,Watten and Khatkhate, Deena,1980,Money and Monetary Policy in Developing Countries:Survey and Evidence, Pergamon Press.

Coats,Warren,1982, Interest Rates Consequences of Targetting Money,IMF Staff Papers, Vol.29,No.1.

Coats, Warren, 1990, Experiences with Financial Liberalisation:The lessons for India in EPW, May 5- 12.

Friedman,M.,1968, The Role of Monetary Policy,American Economic Review, Vol.58,March.

Phelps,E.,1970, Micro-Economic Foundations of Employment and Inflation Theory,Norton.

Haque,Nadeem,U.,Capital Mobility in Developing Countries-Some Empirical Tests, IMF Working Paper, Washington,December.

Laidler, David,1990.Taking Money Seriously and Other Essays:Cambridge, Massachusetts,The MIT Press.

Majumdar,N.A.,1990,Financial Scenario in the 1990s: Agenda for Reform (in EPW,Vol.XXV-14,April).

Committee on the Financial System Report,GOI,1992, (Narasimham Committee Report)

(iv) Revision of syllabus for M.Sc in Zoology

The revised syllabus for M.Sc in Zoology was considered and approved at the School Board of Life Sciences meeting held on 10.6.92.

The Revised syllabus is placed at Annexure-'A' for consideration of the Council.

NORTH EASTERN HILL UNIVERSITY
DEPARTMENT OF ZOOLOGY

M.SC. COURSE IN ZOOLOGY

SYLLABUS

M.Sc. Zoology syllabus consists of 24 papers including 12 theory papers of 100 marks each and 12 practical paper of 50 marks each. The paper will be taught in four semesters in two years. Each semester will have three theory and three practical papers as detailed below.

EVALUATION

25% of the total marks of each paper will be evaluated internally during the semester following the procedure as prescribed from time to time. Rest 75% will be examined at the end semester by external evaluation. Exanimation of each theory paper will be of three hours and each practical paper of four hours duration during end semester examination.

A student is expected to score 35% out of the internal assessment marks in each paper to be eligible to appear in theend semester examination.

NORTH EASTERN HILL UNIVERSITY
DEPARTMENT OF ZOOLOGY

M.Sc. ZOOLOGY PROGRAMME

COURSE DISTRIBUTION

	NAME	Paper No. Theory	Practical
1st Semester	Cell Biology and Immunology	Z-101	Z-102
	Molecular Biology and Biotechnology	Z-103	Z-104
	Functional Anatomy-I	Z-105	Z-106
2nd Semester	Biological Chemestry	Z-201	Z-202
	Genetics and Developmental Biology	Z-203	Z-204
	Functional Anatomy-II	Z-205	Z-206
3rd Semester	Animal Ecology and Behaviour	Z-301	Z-302
	Parasitology, Applied Entomology, Fish and Fisheries	Z-303	Z-304
	Special Paper-I	Z-305	Z-306
4th Semester	Biosystematics and Evolution	Z-401	Z-402
	Techniques in Biology and Biometrics	Z-403	Z-404
	Special Paper- II	Z-405	Z-406

Special Papers Offered :

A. Cell Biology and Immunology
B. Developmental Biology
C. Endocrinology and Reproductive Physiology
D. Entomology
E. Genetics
F. Limnology
G. Parasitic Helminthology

Z-101 CELL BIOLOGY AND IMMUNOLOGY

Unit-1 Cell Structure and Plasma Membrane

1. Structure and organization of bacteria, cyanobacteria and viruses.
2. Structure of eukaryotic cells and the differences with prokaryotic cells
3. Models of plasma membrane organization
4. Structure, Chemical composition and functions of plasma membrane
5. Intercellular communication, endocytosis and exocytosis

Unit-2 Cytoskeleton and cell organelles

1. Types, structure and functions of cytoskeleton
2. Detailed structure and functions of :
   mitochondria
   ribosomes
   lysosomes
   Golgi comples
   chloroplasts
   endoplasmic reticulum

Unit-3 Eukaryotic nucleus and cell division

1. Nuclear membrane and nucleolus
2. Chromatin - types, structure, composition and functions
3. Synapsis and synaptonemal complex
4. Crossing over and chiasma formation
5. An account of cell cycle
6. Malignant growth

Unit-4 Immunology-I

1. Innate and acquired immunity, Immunclogical memory
2. Cells and organs of immunity
3. Humoral and cell mediated immune response - components and characteristics features
4. Immunoglobulins - basic structure, classes and functions
5. Antigens-epitopes, antigenicity, adjuvants and haptens
6. Antigen-antibody reaction

Unit-5 Immunology-II

1. Lymphokines-interleukins
2. Mechanism of antibody diversity
3. Delayed/immediate hypersensitive reactions
4. Major histocompatibility complex - H-2, Class I & II antigens
5. Alternated/classical complement pathways

Z-102 CELL BIOLOGY AND IMMUNOLOGY PRACTICALS

1. Prepapation of solutions, fixatives of different normality, morality and dilutions
2. Study of mitosis in onion root tips
3. Study of meiosis in grasshopper testis
4. Study sex-chromatin in human buccal cavity cells
5. Isolation and staining of mitochondria from mammalian liver
6. Dissection and histology of lymphoid organs in mice/rat
7. Antigen-antibody reaction-Double radial immunodiffusion
8. Study of bone-marrow cells from mice
9. Study of lymphocytes/monocytes in blood smears from mice
10. Determination of blood groups in human
11. Phagocytosis in spleen macrophages

Suggested readings

1. Alberts, B, Bray D, Lewis J, Raff M, Roberts K and Watson J D (1983) Molecular biology of the cell, Gardland Publishing Inc
2. Cooper E L (1982) General Immunology, Pergamon Press.
3. Darnell J, Lodish H and Baltimore D (1990) Molecular cell Biology, Scientific American Books.
4. DeRobertis EDF and DeRobertis EMF (1987) Cell and Molecular Biology, 8th Edition, Lea and Febiger, International edition
5. Dewitt (1977) Biology of the cell - An Evolutionary Approach, Saunders Co.
6. Roitt I M (1984) Essential Immunology, Blackwell Scientific Publications.
7. Roitt I M Brostoff J and Male D K (1985) Immunology, Gower Medical Publishing.
8. Thorpe N O (1984) Cell Biology, John Wiley & Sons.

Z-103 MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Unit-1 Structure and Properties of nucleic acids

1. Prokaryotic and eukaryotic genomes
2. Nucleic acid as genetic material, information flow
3. Detailed structure of DNA
4. Physico-chemical properties of DNA
5. A, B and Z DNA
6. Types, structure and properties of prokaryotic and eukaryotic RNAs

Unit-2 Replication and Transcription

1. DNA replication - semiconservative, structure and properties of DNA polymerases in prokaryotes and eukaryotes
2. Mechanism and enzymology of DNA and RNA replication
3. Transcription - sense and antisense strand, Structure and properties of RNA polymerases in prokaryotes and eukaryotes
4. Mechanism of transcription - initiation, elongation and termination
5. Reverse transcription

Unit-3 RNA processing, genetic code and protein synthesis

1. Characteristic feature and mechanism of RNA Processing
2. Genetic code-triplet codon concept, features of genetic code
3. Translation - initiation, elongation and termination of protein synthesis
4. Protein secretion and signal hypothesis

Unit-4 Regulation of gene expression

1. Gene expression - Operon concept
2. Inducible operon - Lac operon
3. Repressible operon - Trp. operon
4. Concept of eukaryotic gene regulation and its difference with prokaryotic system
5. Concept of oncogenes and its role in cancer

Unit-5 Genetic Engineering and its application

1. Bacterial genetic - transformation, conjugation, transduction and sex-duction

2. Principles and methods of genetic engineering
3. DNA transformation techniques
4. Gene targeting
5. Application in agriculture, health, medicine and industry

Z-104 MOLECULAR BIOLOGY AND BIOTECHNOLOGY - PRACTICALS

1. Extraction of DNA from mammalian liver and kidney
2. Extraction of RNA from mammalian liver and kidney
3. Estimation of DNA
4. Estimation of RNA
5. Separation of lymphocytes by ficoll gradient.
6. Radiation induced chromosomal abberations
7. Gel Electrophoresis
8. To study the absorption maxima of DNA and protein

Suggested Readings

1. Ayala F J and Kiger J A (1984) Modern genetics 2nd Edition, Benjamin/cumming Publ.
2. Freifelder D (1987) Molecular Biology, 2nd Edition, Jones and Bartlett Publishers, Inc.
3. Glover D M (1985) Gene Cloning Vol. I, IRL Press.
4. Lewin B (1990) Genes, 4th Ed., John Willey & Sons.
5. Saenger W (1984) Principles of Nucleic Acids Structure, Springer-Verlag.
6. Stryer L (1988) Biochemistry, W.H. Freeman & Co.
7. Watson J D et al. (1987) Molecular Biology of the Gene. 4th Ed., The Benjamin/Cummings Publishing Co.
8. Wildiamson R (1982) Genetic Engineering, 2. Academic Press.

Z-105 FUNCTIONAL ANATOMY-I

Unit-1 Locomotion

1. Amoeboid and Fibrillar Movement
Theories of Amoeboid movements and types of amoeboid cells

Ciliary movements

Contractile Proteins, Fibrils, Microfilaments

Microtubules

Environmental effects on ciliary and amoeboid movements

2. Principles of Hydrostatic Skeleton

Locomotion based on hydrostatic skeleton

Coelom in locomotion

Locomotion in arthropods

3. Organization of Vertibrate Endoskeletal System and Musculature in locomotion

Structure and physiology of vertibrate muscle

Locomotion in tetrapod vertibrates

Evolution of bipedal locomotion

4. Aerodynamics in Relation to Flight

Insects, Birds and mammals

5. Muscular Contraction and Electric Organs

Unit-2 Food and nutrition

1. Nutritional Patterns in Animals

Mechanism if Food Intake, Symbiotic Nutrition, Food Selection and its Regulation

2. Physiology of Digestion

Digestive Enzymes in Vertibrates; secretion and regulation in mammals

Mechanism in digestion

Absorption of different food materials; Vitamins

3. Contractility of Gastrointestinal Tube and its Neural Control in Vertebrates

4. Gastrointestinal Hormones

5. Special Dietry Requirements of some Animals

Unit-3 Body Fluid & Circulation

1. Intracellular, Transport in Protozoa

2. External Media as the Medium of Transport in Sponges and Coelenterates etc.

3. Blood Vascular System

Open and close Types

Lymph channels in vertebrates

Evolution of fluid compartments

Pressure and flow in circulatory systems and their regulation

Physiology of blood

4. Heart as a pumping organ

Chambered Hearts

Tubular Hearts

Ampullar Hearts

Neurogic & Myogenic Hearts

Characteristics of Vertebrate Cardial Muscles

Heart Beat

Unit-4 Respiration

1. Respiratory Organs in Arthropods and Vertebrates

Aquatic Respiration

Aerial Modes of Respiration

2. Respiratory Functions of Blood

Distribution and Brief Chemistry of Respiratory Pigments

Functions of Haemoglobin in vertebrates

Functions of other pigments in invertebrate

Haemopoiesis

Function of Haemoglobin during embryonic development and in adult vertebrates

3. Coagulation, Blood Groups, Oxygen curves

4. Environmental Influences on Respiration

Unit-5 Excretion and Osmoregulation

1. Coelom

   Coelomoducts

   Nephridia in Nonchordates

2. Development, Structure and Physiology of Vertebrate Kidney

   Role of Vertebrate Kidney in Body Water Regulation
   Characteristic Adaptations of Desert Living Mammals

3. Nitrogen Excretion Patterns

   Adaptation to Environmental Stress

   Regulation of Nitrogen Excretion; Homoeostasis

4. Osmotic Conformity and Regulation

   Osmotic Conformers

   Osmotic Regulators

Z-106 FUNCTIONAL ANATOMY-I PRACTICAL

1. Study of locomotory organs in : Amoeba, Ciliates, Flagellates
2. Study of locomotion in : Earthworm, Leech, Insects, Crustaceans
3. Locomotion and locomotory organs in vertebrates : Fishes and frogs
4. Recording of muscle contraction in vertebrates : Toads or Frogs
5. Recording of heart beat in toad or frog-effect of chemicals on beats
6. Anatomical study of Alimentary Canal in relation to food and feeding in : Caenivores, Herbivores, Omnivores, Blood suckers
7. Qualitative determination of Digestive Enzymes and Absorption of digested food materials
8. Study of Respiratory System in : Insects, Crustaceans, Fishes and other vertebrates
9. Blood Corpuscles, Haemoglobin, Oxygen consumption in aquatic and terrestrial animals
10. Anatomical study of Excretory organs in : Fish, Frog, Lizard, Bird and Mouse
    (a) Kidney structure
    (b) Determination of Abnormal and Normal Urine
11. Quantitative estimation of Glycogen, Casein, Ascorbic acid

Suggested Reading

1. Barnes R D (1968) Invertebrate Zoology, Saunders.

2. Barrington E J W (1979) Invertebrate Structure and Function, Boston-Houghtom, Meffin and Elbs.

3. Eckert R and Randall D (1978) Animal Physiology, W. H. Freeman and Company.

4. Gordon M S et al. (1982) Animal Physiology, Macmillan Publishing Co., Inc.

5. Hainsworth F R (1981) Animal Physiology : Adaptations in Functions, Addison-Wesley Publishing Co.

6. Hoar, W S (1976)General and Comparative Physiology, Prentice-Hall of India Pvt. Ltd.

7. Hyman L H (1940) The Invertebrates, Vol.I to Vol.6, McGraw Hill Book Co.

8. Keele, C A and Neil E (1974) Samson Wright's Applied Physiology (12th Edition), ELBS and Oxford University Press.

9. Prosser D L & Brown F A (1966) Comparative Animal Physiology, Saunders.

10. Prosser C L (1984) Comparative Animal Physiology, Saunders.

11. Schmidt-Nielsen K (1985) Animal Physiology; Adaptation and Environment, Cambridge.

Z-201 BIOLOGICAL CHEMISTRY

Unit-1

1. Bio-molucules, macromolecules and their monomeric units
2. Structure of atoms, chemical bonds and their importance in biological interactions
3. pH and buffer - significance, Henderson-Hasselbalch equation and simple calculations on pH and buffer
4. Classification, structure, function and chemistry of carbohydrates, lipids, fatty-acids, amino acids and proteins
5. Levels of structural organization of proteins

Unit-2

1. Laws of thermodynamics and its use in cellular reactions
2. Free energy and energy rich compounds and their biological significance
3. Redox potential, Mitochondrial oxidative phosphorylation, ATP synthesis, chemiosmotic theory
4. General account of biochemical pathway of photosynthesis and electron flow

Unit-3

1. Intermidiary metabolism and its significance
2. Embden-Mayerhoff pathway
3. T.C.A. cycle
4. Gluconeogenesis
5. Glucogenesis and Glycogenolysis
6. Hexose-monophosphate shunt
7. Reactions of amino acids - deamination, transamination, decarboxylation and oxidation
8. Urea cycle
9. Oxidation and biosynthesis of fatty acids

Unit-4

1. Enzymes-classification, specificity and various properties of enzymes
2. Energetics of enzyme catalyzed reactions, active site
3. Mechanism of enzyme action and regulation of enzyme action activity
4. Inductions and inhibitions of enzyme activity.

Unit-5

1. Enzyme Kinetics – Michaelis-Menten equation, determination and significance of Km, calculations on enzyme kinetics
2. Allosteric enzyme, Isoenzymes
3. RNA as enzyme, vitamins as co-enzymes, cofactors
4. Prostaglandins

Z-202 BIOLOGICAL CHEMISTRY PRACTICALS

1. Titration of weak acid (acetic acid) and preparation of buffer
2. Determination of pKa ~~of~~ of amino acids
3. Estimation of sugar using anthrone reagent
4. Estimation of ~~ameni~~ amino acids using Ninhydrin reagent
5. Estimation of protein using Biurat reagent
6. Estimation of protein using Folin's reagent
7. Separation and identification of amino acids by paper chromatography
8. Separation and identification of sugars by paper chromatography
9. Estimation of cholesterol
10. To study the effect of time on enzyme activity
11. To study the effect of temperature on enzyme activity
12. To study the effect of substrate concentration on enzyme activity
13. To study the effect of an inhibitor on enzyme activity
14. Determination of Km and Vmax of enzyme by Michaelis-Menten and L.B. Plots

Suggested Readings

1. Cohn E E and Stumph P K (1976) Outlines of Biochemistry, 4th Ed, Willey Eastern Ltd.
2. Lehinger A L (1984) Principles of Biochemistry, C.B.C. Publishers.
3. Murray R. K et al. (1988) Harper's Biochemistry, 21st Ed., Prentice-Hall International.
4. Plummer D (1979) Practical Biochemistry, Tata McGraw Hill
5. Rawn J D (1989) Biochemistry, North Carolina Biol. Supply Co.
6. Stryer L (1988) Biochemistry, W.H. Freeman and Company.

Z-203 GENETICS AND DEVELOPMENTAL BIOLOGY

GENETICS

Unit-1

1. Principles of Mendelian inheritance, allelic interations, incomplete dominance, codominance, sex-linked genes, linkage
2. DNA as the genetic material, The law of DNA constancy, Unique sequences, Repetitive sequences (Satellite DNA), C-value paradox, Transposable elements, DNA methylation, Genetic code
3. RNA as the genetic material extrachromosomal inheritance (episome, mitochondria and chloroplasts)

Unit - 2

1. Concept of gene, interupted gene, overlapping gene, pseudogene, conserved gene, complementation test
2. Mutation: Chromosomal, gene-mutation, spontaneous, induced, molecular basis, Detection, DNA damage, repair and retrieval
3. Behavioural genetics : Genetics of mental retardation, intelligence, behaviour and chromosomal anomalies

Unit - 3

1. Inborn errors of metabolism and other monogenic conditions, gene and enzymes
2. Polygenic and environmental disorders; chromosomes and cancer, Genetic councelling, Gene therapy
3. Somatic cell genetics, transgenesis

DEVELOPMENTAL BIOLOGY

Unit - 1 Early events - from egg to embryo

1. Historical review and scope of Developmental Biology
2. Differentiation and functional organization of sperms
3. Differentiation and functional organization of eggs
4. Regulation of oocyte growth, maturation and evulation
5. Egg-sperm interaction and biochemical basis of fertilization
6. In vitro fertilization and embryo transplantation
7. Prevention of polyspermy, egg activation and rearrangement of egg cytoplasm

8. Parthenogenesis
9. Cleavage - patterns and mechanism; equivalence of pronuclei
10. Gradients and polarity concepts
11. Gastrulation in vertebrates - concepts of organizer and induction; establishment of primary germ layers

Unit - 2 Organogenesis - stability of the differentiated state

1. Totipotency and determination of blastomeres
2. Morphogenetic determinants and maternal control of early development
3. Role of nuclear - cytoplasmic interactions in determinatio
4. Metaplasia and transdetermination
5. Differential gene expression and differentiation
6. Segmentation genes and homeotic genes in Drosophila
7. Differentiation gone out of control
8. Tissue interaction in development
9. Tissue interactions in the morphogenesis of vertebrate ; eye, brain, heart, limb and liver

Unit - 3 Exceptions to the stability of the differentiated state

1. Metamorphosis in insects
2. Metamorphosis in amphibians
3. Environmental and hormonal control of metamorphosis; heterochrony
4. General consideration of regeneration - morpholaxis and epimorphosis
5. Regeneration in flatworms and coelenterates
6. Regeneration of amphibian limb, tail and eye lens
7. Mechanism of regeneration
8. Growth patterns - isometric and allometric growth
9. Physiology of growth : frowth factors

-204 GENETICS AND DEVELOPMENTAL BIOLOGY PRACTICALS

GENETICS

1. Study of Meiosis and preparation of permanent slides from Grasshopper testis

2. Preparation of salivary gland poly thene chromosome and its mapping from Chironomus

3. Preparation of Karyotypes

4. Study of metaphase chromosome from rat/mice bone marrow and/or from kidney of fish

5. Drosophila Genetics

   i) Preparation of culture medium
   ii) Study of wild and mutants
   iii) Study of life cycle and handling of flies
   iv) Monohybrid cross
   v) Dihybrid cross

DEVELOPMENTAL BIOLOGY

1. Gametogenesis

   Study of sperms and ova

   Oocyte maturation in frog

   Comparison of different types of eggs - of mollusc, insect, fish, frog bird and mammal

2. Fertilization

   Artificial fertilization and egg activation in frog

   Examination of body cavity - oviducal and uterine eggs of frogs, testing their fertilizability

3. Cleavage

   Comparison of different types of cleavage

   Influence of temperature and pressure on cleavage

   Cleavage arrest

4. Gastrulation

   Observation of morphogenetic movements in frog/chick grastrulae using vital dyes

   Exogastrulation

5. Normal Development
   - in frog and chick

6. Regeneration

Morpholaxis in Hydra

Epimorphosis in Planaria

Epimorphosis in Anura

Reference Books

1. Gardner EJ and Snustad DP (1984) Principles of Genetics. 7th Ed. Willey & Sons.

2. Hartl DL, Freifelder D and Snyder LA (1988) Basic Genetics, Jones & Bastlett.

Suggested Readings

1. Lewin B (1990) Genes. 4th Ed. Willey & Sons.

2. Strickberger MV (1985) Genetics, Macmillan Pubs. Co.

3. Woodward DO and Woodward VW (1980) Molecular Genetics. MacGraw Hill.

4. Edelman GM (1985) Molecular determination of animal form. Alan R.Reis.

5. Loomis WF (1987) Genetic Regulation of Development. Alan R.Reis.

6. Sang JH (1984) Genetics and Development. Longman Inc.

7. Slack JMH (1983) From Egg to Embryo. Determinative events in early development. Cambridge Univ. Press.

8. Wessells NK (1977) Tissue interactions and development. Benjamin/ Cummings.

Z-205 FUNCTIONAL ANATOMY - II

Unit-1 Neural Integration

1. Active transport across membrane and excitability of membrane
2. Electrical and chemical transmission between cells
3. Neurotransmitters and nerve conduction
4. Adaptive features of conduction in nerves : Glial function
5. Physiology of nerve net systems and giant fibre function
6. Centralization and cephalization of neural integration
7. Evolution of functional anatomy of vertebrate brain
8. Development of neural functions and changes in central nervous function
9. Polyneural innervation of fast vertebrate postural muscles
10. Major sense organs and sensory receptors

Unit - 2 Chemical Integration

1. Features of hormonal integration
2. Neurohormones, hormones and concept of neuroendocrine integration
3. Chemistry of hormones
4. Biosynthesis and storage of hormones
5. Transport and metabolism of hormones
6. Mechanism of hormone action

Unit - 3 Endocrine organs in invertebrates and vertebrates

1. Neurosecretion and neuroendocrine relations in non-arthropod invertebrates
2. Neuroendocrine organ in Insecta and Crustacea
3. Hypothalamo-hypophyseal complex in vertebrates
4. Evolution of pituitary, thyroid gland, adrenal and pineal gland
5. Gastro-intestinal hormones

Unit-4 Hormonal Regulation

1. Hormonal control of metamorphosis, development, metabolism and reproduction in Insecta
2. Hormonal control of moulting, metabolism and reproduction in Crustacea
3. Endocrine regulation of digestion
4. Hormonal integration of carbohydrates and lipid metabolism
5. Hormones influencing metabolic rate and calorigenesis
6. Hormonal regulation of calcium metabolism
7. Hormonal regulation in osmoregulation
8. Hormones in migration of fish and birds
9. Role of hormones in immune response

Unit-5 Reproduction

1. Patterns of reproduction in invertebrates and larval forms
2. Evolution of urinogenital system in vertebrates
3. Organs of reproduction in vertebrates
4. Reproductive processes and their regulation
5. Reproductive cycles

Z-206 FUNCTIONAL ANATOMY-II PRACTICALS

1. Exposure of endocrine glands in insect and crustaceans
2. Comparative anatomy of brain in representative animals of each Chordate group
3. Neck nerve in a mammal
4. Comparative anatomy of male and femal genital organs of representative chrodate groups
5. Morphology, histology of pituitary, pineal, thyroid, parathyroid, adrenal glands in representative animals of each chrodate groups
6. Orchidectomy in mammals
7. Ovariectomy in mammals
8. Thyroiddectomy in mammals
9. Adrenalectomy in mammals
10. Study of Estrous cycle

Suggested Readings

1. All books referred for Functional Anatomy - I Paper (Z-105)

2. Bentley PJ (4976) Comparative Vertebrate Endocrinology, Cambridge Univ. Press

3. Gornman A, Dickhoff WW, Vigna SR, Clark NB and Ralph CL (1983) Comparative Endocrinology, Willey International.

4. Highman KC and Hill L (1977) The Comparative Endocrinology of the Invertebrates, EILBS & Edward Arnold, Ltd.

Z-301 ANIMAL ECOLOGY AND BEHAVIOUR

Unit-1

1. Basic concepts, objectives and scope, General nature of ecological responses
2. The structure of ecosystem, aboitic and biotic components, relationships, Homeostasis
3. Law of limiting factors : Shelfard's Law of Tolerance and Leibig's law of minimum. Important limiting factors

Unit-2

1. Diversity of ecosystems: Terrestrial, freshwater and marine ecosystems, salient features.
2. The Biotic community concept and community analysis : organization, density, relative abundance frequency, constancy, dominance, fidelity, carrying capacity, species diversity
3. Community development : ecological succession and climax community

Unit-3

1. Population ecology : population density, growth patterns, effect of density dependent and density independent factors
2. Natality, mortality, life history strategies, age and sex ratios, survivorship curves and life tables
3. Population interactions : Mutualism, Commensalism, Protocooperation, Predation, Parasitism, Competition, Niche concept

Unit-4

1. Trophic dynamics : Food chain, food web, trophic relationships, ecological pyramids, energy transfer, ecological efficiencies
2. Productivity : Concepts and assessment of primary and secondary production
3. Biogeochemical cycies : Phosphorus, Nitrogen, Carbon, and Sulphur cycles, Impact of human activity on nutrient cycles.

Unit-5

1. Feeding, learning, social and sexual behaviours of animals
2. Parental care, circadian rhythms, mimicry
3. Migration of fishes and birds. Sociobiology

Z-302 ANIMAL ECOLOGY AND BEHAVIOUR PRACTICALS

1. Analysis of pH, specific conductivity and moisture content of soil samples
2. Estimation of organic content of soil samples
3. Temperature profile insoil layers
4. Composition, abundance and distribution of soil arthropods
5. Estimation of population size from known and unknown samples (dots).
6. Estimation of population size by mark recapture method
7. Morphological variations in a natural population of snails .
8. Response of housefly to thermal stress
9. Population growth and succession in laboratory culture of Protozoa
10. Effect of crowding in fecundity of Drosphila
11. Analysis of pH and specific conductivity of water samples
12. Estimation of dissolved oxygen and free carbon dioxide contents of water
13. Estimation of total alkalinity and total hardness of water
14. Qualitative analysis of aquatic communities from a pond and a lake
15. Examination of aquatic communities from flowing water
16. Comparison of species diversity and quantitative abundance of aquatic communities of clean and polluted waters
17. Estimation of primary production (Harvest method) in a terrestrial ecosystem
18. Estimation of primary production in an aquatic ecosystem

Suggested Readings

1. Dajoz R (1977) Introduction to Ecology, Hodder and Stoughton.
2. Kormondy E J (1978) Concepts of Ecology, Prentice-Hall of India Pvt.Ltd.
3. Krebs C J (1978) Ecology : The Experimental Analysis of Distribution and abundance (2nd Ed.), Harper and Row Publishers
4. Odum E P (1971) Fundamentals of Ecology (3rd Ed.),W.B.Saunders Company.
5. Odum E P (1975) Ecology, Holt, Rinehart and Winston Inc.
6. Remmert H (1980) Ecology, A Text book, Spring-Verlag.
7. Smith R L (1974) Ecology and field Biology (2nd Ed.), Herper and Row Publishers.

Z-303 PARASITOLOGY, APPLIED ENTOMOLOGY, FISH AND FISHERIES

PARASITOLOGY

Unit-1

1. Introduction to parasitism, various symbiotic association, definitions
2. Protozoa : Introduction to parasitic forms: Life cycle and pathogenicity of parasitic amoebae, trypanosomes, Leishmania, Plasmodium, piroplasma, ciliates of man; parasites of fishes.

Unit-2

1. General account of helminth parasites
2. Life cycle and pathogenicity of - Schistosoma, Fasciola, Taenia, Echinococcus granulosus, Ascaris, Dracunculus, Wuchureria
3. Plant-parasitic nematodes

Unit-3

1. Host - parasite interactions : Parasite - host, specificity: immunity - types, mechanism in relation to important human/animal parasitic infections, antigenic variations among parasites.
2. Applications of recombinant DNA technology in understanding the molecular basis of parasitism.

APPLIED ENTOMOLOGY

Unit-4

1. Biology and control of insect pests of agricultural importance; insect pest management
2. Beneficial insects : Apiculture, Sericulture, Lac culture
3. Arthropods of medice-veterinary importance as pathogens, as vectors of parasitic diseases

FISH AND FISHERIES

Unit-5

1. Importance freshwater, brackishwater and coastal fishes of India
2. Conventional and non-conventional fish practices
3. Carp fish farm and its management

Z-304 PARASITOLOGY, APPLIED ENTOMOLOGY, FISH & FISHERIES

PRACTICALS

1. Preparation and study of enteric and parenteric protozoan parasites from frog, fish, earthworm
2. Preparation of thin and thick blood smears for detection of blood parasites
3. Study of blood smears depicting haemoflagellates, haemosporidia, microfilariae
4. Exploration of parasitic infections in vertebrate hosts with special reference to locally available fish, amphibia and mammalian hosts; collection, preservation and study of parasites recovered
5. Study of helminth parasites of economic importance from permanent preparations
6. Isolation and preparation of plant parasitic nematodes
7. Whole mount preparation and study of some vectors/pests
8. Study of human body louse, dog's louse and cat flea from permanent preparations
9. Observations on morphometric and meristic variations in selected fishes
10. Analysis of composition of food items of selected species of fish
11. Visit to local fish farm to learn induced breeding techniques, to examine water quality and composition of fish food organisms

Suggested Readings

PARASITOLOGY

1. Chatterjee K D (1980) Parasitology; Protozoology and Helminthology in relation to clinical medicine (12th Ed.), published by author.
2. Cheng T C (1986) General Parasitology (2nd Ed.), Academic Press.
3. Cox F E G (1982) Modern Parasitology, Blackwell's Scientific Publications.
4. Faust E C, Beaver P C and Jung R C (1975) Animal agents and vectors of human diseases (4th Ed.), Lea & Febiger.
5. Schmidt G D (1989) Foundations of Parasitology, Mosby
6. Soulsby E J L (1982) Helminths, Arthropods and Protozoa of domesticated animals (7th Ed.), Bailliere, Tindall and Cassell Ltd.

APPLIED ENTOMOLOGY

1. Lamb K P (1974) Economic Entomology in the Tropics, Academic Press
2. Ramkrishna Ayyar T V (1984) Handbook of Economic Entomology for South India, International Books and Periodicals Service.
3. U.S.D.A. Insects : The Year Book of Agriculture (1969), Oxford & IBH Publication Co.

FISH AND FISHERIES

1. Balsare D K (1986) Tropical Fish Farming, Environmental Publications

2. Jhingran V B (1980) Fish and Fisheries of India (2nd Ed.), Hindustan Publishing Corporation

3. Kurian C V and Sebastian V O (1982) Prawns and Prawn Fisheries in India, Hindustan Publishing Corporation

4. Talwar P K and Jhingran V G (1991) Inland Fisheries of India and adjacent countries. Oxford & IBH Publishing Co. Pvt. Ltd.

Z-305

SPECIAL PAPER-I
A. CELL BIOLOGY AND IMMUNOLOGY

Unit-1

1. Plasma membrane-chemical composition, membrane lipids, proteins and carbohydrates, asymmetry, cell surface coat
2. Membrane assembly
3. Membrane associated antigens and receptors
4. Membrane potentials and nerve impulses
5. Membrane transport of small molecules, macromolecules and particles
6. Cell surface changes in malignant cells

Unit-2

1. Topography of cytoskeleton
2. Microtubules - molecular structure and function
3. Microfilaments - molecular structure and functions
4. Intermediate filaments, lattice
5. Microtubules in cells motility - cilia and flagelia

Unit-3

1. Intercellular junctions-adhering, impermeable and communicating
2. Extracellular matrix and cell adhesion-collagen, elastin, proteoglycane, fibronectin, laminin
3. Membranes of cell organelles - mitochondria, Golgi complex, lysosomes, endoplasmic reticulum, chloroplasts, nuclear membrane
4. Cell secretion - secretory pathway, stages of secretion

Unit-4

1. Various transporting systems across mitochondrial membrane
2. Redox potential, respiratory chain, oxidative phosphorylation in mitochondria and photophosphorylation in chloroplasts
3. Biogenesis of mitochondria and chloroplasts, their genomes and replication

Unit-5

1. Cell cycle - its components, various modifications during cell cycle, control of cell cycle
2. Tissue culture - monolayer, suspension, leukocyte culture
3. Difference of normal and cancer cells, cell transformation - mechanism

4. Tumour associated antigens and markers

5. Effects p of radiations and chemicals on cells- mutagens, pollutants and drugs, DNA repair mechanism

6. Hormones in relation to cancer cells.

Z-306 SPECIAL PAPER - I PRACTICALS

CELL BIOLOGY AND IMMUNOLOGY

1. Principles and functions of light, phase and fluorescent microscopes, demonstration of cells, nucleic acid with acridine orange, ethidium bromide

2. Tissue homogenization and fractionation by differential centrifugation for isolation of mitochondria, nuclei and cytosol. Use of marker enzymes for assessment of purity of components

3. Fractionation of tissue DNA, RNA and protein and its quantitation

4. Studies on patching and capping using FITC labelled con A and lymphocytes

5. Preparation of single cell suspension of cell viability studies and cell counting under haemocytometer

6. Agglutination studies on normal and tumour cells using lectin/seed extracts

7. Estimation of free and total sialic acids of cells/tissues

8. Study of cancer cells-morphology, shape of nuclei, chromosomes, enzymes

9. Tumour transplantations, ascitic cells in mice and preparation of cell smears

10. Electrophoretic separation and staining of proteins/glycoproteins

11. Microphotography, developing and printing

Suggested Readings

1. Alberts B, Bray D, Lewis J, Raff M, Roberts K and Watson J D (1983) Molecular Biology of the cell, Garland Publishing Inc.

2. Darnell, J. Lodish H and Baltimore D (1990) Molecular cell Biology, Scientific American Books.

3. Farmer P B and Walker J M (eds.) (1985) The molecular basis of cancer, Croom Helm Ltd.

4. Jain M K (1988) Introduction to biological membranes, John Willey & Sons

5. Prescott D M (1988) Cells : Principles of molecular structure and function, Jones & Bartlett Publishers.

6. Rao V K (1987) Role of cell surface in development, Vol.I, II. CRC Press

7. Shah V C (1987) Essential techniques in cell biology, Anand Publications

8. Sheeler P and Bianchi D (1983) Cell Biology : structure, biochemistry and functions, John Willey & Sons.

9. Tannock I F and Hill R R (Eds.) (1987) The basic science of oncology, Pergamon Press.

10. Thorpe N O (1984) Cell Biology, John Willey & Sons.

11. Vincent D V et al. (eds.) (1985) Principles and practice of Oncology, Lippincot Co.

Z-305 SPECIAL PAPER-I

B. DEVELOPMENT BIOLOGY

Unit-1 Evolution of Morphogenesis and Differentiation

1. Morphogenesis and differentiation in unicellular eukaryotes : Acetabularia and Naegleria
2. Morphogenesis and differentiation in colonial eukaryotes : Volvocales and Dictysotelium

Unit-2 Mosaic Development

1. Early development of Dentalium/Illyanassa
2. Imaginal discs and their differentiation clones, polyclones and compartment hypothesis
3. Cell lineage in annelids and tunicates

Unit-3 Segmentation

1. Formation and fate of somites in vertebrates
2. Segmental structure of Drosphila larva

Unit-4

Models of Tissue Interactions

1. Epithelial - mesenchymal interactions
2. Specificity of mesenchymal interactions
3. Genetic control of inductive interactions

Unit-5 Development of Immune System and Ageing

1. Differentiation of T and B lymphocytes
2. Fetal antigenicity and protection against maternal immune response
3. Genetically programme development of immune response
4. Ageing : Theories of ageing, immune system and ageing

Z-306 SPECIAL PAPER-I PRACTICALS

DEVELOPMENT BIOLOGY

1. Study of life cycle of slime mould and volvox
2. Study of development of a common pond snail
3. Observation of segmentation in Drosophila larva
4. Study of limb development in frog and chick embryos
5. In situ colouring of limb skeleton in frog tadpoles and chick embryos
6. Study of the effect of diet on ageing in mice
7. Chorio-allantoic grafting of organ rudiments in chick embryos

Suggested Readings

1. Balinksky B I (1976) An Introduction to Embryology (4th Ed.) W.B. Saunders & Co.

2. Berril N J & Karp G (1978) Development, Asian Students ed.

3. Browder L (ed.) (1987) Developmental Biology Comprehensive Synthesis, Vol.1 & 2.

4. Browder L W (1980) Developmental Biology

5. Gall J G (ed.) Gametogenesis and the early embryo, Alan R Reis

6. Gilbert S F (1988) Developmental Biology, 2nd ed. Sinauer, Sunderland

7. Gilbert L I & Fieden E (1981) Metamorphosis : A Problem in Developmental Biology, Plenum.

8. Grant P (1978) Biology of developing systems. Holt Saunders International eds. Holt, Rhinehart & Winston

9. Langman J (1990) Medical Embryology 6th ed. Williams & Wilkins

10. Metz C B and Monroy A (eds.) (1985) Biology of fertilization, Academic Press.

11. Niewwkoop P D and Sutasurya L A 1979) Primordial germ cells in the chrodates, Cambridge University Press

12. Oppenheimer S B (1980) Introduction to embryonic development, Allyn & Beacon Inc.

13. Raff R A & Raff S C (eds.) (1987) Development as an evolutionary process, Alan R.Reis.

14. Thomas R & Reif W (eds.)(1988) The construction of living organisms, Sinauer

Z-305

SPECIAL PAPER-I

C. ENDOCRINOLOGY AND REPRODUCTIVE PHYSIOLOGY

Unit-1 Hormones and Hormone action

1. Chemical nature of hormones
2. Biosynthesis of steroid hormones
3. Biosynthesis of amino acid derived hormones : thyroid hormones, catecholamines, melatonin, peptide hormones
4. Receptors of hormones
5. Steroid hormone-receptor interaction and signal transduction
6. Membrane bound hormone receptors and signal transduction
7. Second messengers in hormone action : Role of cyclic nucleotides, Ca^{2+}, and phosphoinostides
8. Receptosomes and recycling of membrane bound receptors

Unit - 2 Neuroendocrine Integration in Vertebrates

1. Hypothalamo-hypophyseal complex
2. Role of transmitters in regulation of anterior pituitary hormonal release (TSH-RH, Gn-RH, ACTH-RH, GH-RH, Somatostatin, PIF-RH)
3. The role of pineal in the transduction of environmental cues
4. Neuroendocrine inter-relationship in the regulation of seasonal reproduction
5. Pheromones in reproduction of mammals

Unit-3 Ploymorphism and evolution of hormones

1. Steroids
2. Tyrosine derivatives
3. Neurohypophyseal peptides
4. Hormones of the median eminence
5. Renin-Angiotensin system
6. Parathormone and calcitonin
7. Gastro-intestinal and pancreatic hormones

Unit-4 Testis

1. Gonadal sex determination
2. Endocrine differentiation of testis
3. Histology of testis and structure of sperm
4. Hormonal control of spermatogenesis

5. Structure and function of Leydic cells
6. Structure and function of the male accessory reproductive tract
7. Biochemistry of semen

Unit-5 Ovary

1. Endocrine differentiation of ovary
2. Role of foetal androgens and Mullerian inhibiting substances
3. Histology of ovary
4. Hormonal control of folliculogenesis and ovogenesis
5. Structural factors in ovulation and luteinization
6. Corpus luteum and its function
7. Factors regulating luteolysis

Z-306 SPECIAL PAPER-I PRACTICALS

ENDOCRINOLOGY AND REPRODUCTIVE PHYSIOLOGY

1. Maintenance of a rat/mice colony
2. Study of male and female reproductive systems in some representative animals
3. Orchidectomy in rodents
4. Ovariectomy in rodents
5. Vasectomy, vasoligation in rodents
6. Tubectomy, tubal ligation in rodents
7. Effect of bilateral castration and androgen replacement in rodents
8. Cryptochidism and its effect on testicular histology in rodents
9. Adrenalectomy and its effect on survival in rodents
10. Study of estrous cycle in albino rat
11. Induction of pseudopregnancy in rodents

Suggested Readings

1. Bolander F F (1989) Molecular Endocrinology, Academic Press
2. Daniel J C (1978) Methods in Mammalian Reproduction, Academic Press
3. DeGroot L J (1989) Endocrinology, Vol. 1-3, Springer-Verlag

4. Dekrester D M, Burger, H G and Hudson B (1983) The Pituitary and Springer-Verlag

5. Evangelopoulos A E et al (1989) Receptors, Membrane Transport and Signal Transduction, Springer-Verlag

6. Finn C A (1982) Oxford Reviews of Reproductive Physiology, Oxford University Press.

7. Hogarth P J (1978) Biology of Reproduction, Willey International

8. Kleinman R L (1990) Hormonal Contraction, IPPF Medical Publications

9. Kleinman R L (1991) Intrauterine Contraception, IPPF Medical Publications

10. Martin C R (1978) Text Book of Endocrine Physiology, Williams and Wilkins

11. O'Malley B W and Birnbaumer L (1978) Receptors and Hormone Action. Academic Press

12. Schulster D and Levitzki A (1980) Cellular Receptors for Hormones and Neurotransmitters, John Willey and Sons.

13. Steinberger A and Steinberger E (1980) Testicular Development, Structure and Function, Raven Press.

14. Volrath L (1981) The Pineal Organ, Springer-Verlag

15. Wilson J D and Foster D F (1985) Williams Text Book of Endocrine W.B. Saunders Company

Z-305 SPECIAL PAPER - I

D. ENTOMOLOGY

Unit-1 Basis of insect classification, Classification of Insecta upto Orders

Unit-2 Comparative morphology : head, thorax, abdomen and their appendages

Unit-3 Functional morphology of mouth parts, genitalia, wings and legs

Unit-4 Types of Insect Pest Control; Insecticides; Principles of Insect control: Cultural, Biological, Chemicals and Integrated Pest Control; Physiology of Resistance to Insecticides

Unit-5 Fossil insects; Interrelationships of various insect orders; Origin and evolution of insects

Z-306 SPECIAL PAPER - I PRACTICALS

ENTOMOLOGY

1. Collection preservation and display of insects with emphasis on insects of agriculture, horticulture and medical importance
2. Study of morphology of Grasshopper
3. Study and permanent mount preparations of different types of antennae, mouth parts, legs and wings
4. General anatomy of nervous system of grasshopper, bug, housefly, honeybee, larvae stages of insects
5. Neuroendocrine system of insects
6. Histology of Testes and Ovaries in insects
7. Silk gland of Bombyx
8. Poison apparatus of honeybee and ant
9. Study of pollinating insects and morphological modifications
10. Analysis of pH of various regions of gut

Suggested Readings

1. Barbosa P & Peter T M (1972) Readings in Entomology, Saunders & Co.
2. Chapman R F (1973) Insects, structure and functions, ELBS
3. Imms A D (1970) A General Textbook of Entomology, Chapman & Hall
4. Lefroy H M (1971) Indian Insect Pests, Today's and Tomorrow's Printers & Publishers
5. Romoser W S (1973) The Science of Entomology, Macmillan Publication Co.
6. Smith R F & Mittler T E (1968) Annual Review of Entomology Vol. 1-36, Annual Review Incorporation, USA.

Z-305

SPECIAL PAPER - I

E. GENETICS

Unit-1 Eularyotic chromosome organization

1. Packaging of DNA in the eukaryotic cell
2. Chromatin structure
3. Histones and nonhistones
4. Nucleosome
5. Higher order structure of chromatin
6. Domains & scaffold
7. Active chromatin
8. Assembly of chromatin during replication
9. Changes in chromatin organization during division

Unit-2 Cell division and cell cycle

1. Replication of DNA in prokaryotes
2. Cell division in eukaryote, spindle organization, chromosome movements, molecular mechanism of regulation of cell division
3. Crossing over and chiasma formation
4. Somatic pairing and recombination
5. DNA recombination : homologous, non-homologous, site specific, meiotic
6. DNA repair and retrieval

Unit-3 Human genetics

1. Karyotype and sex chromosome
2. Sex determination, role of Y chromosome, sex mosaics, sex chromosome anomalies, sex influenced alleles, sexlimited genes and hormonal influence
3. Chromosomal syndromes
4. Genetic diseases
5. Genetic counselling
6. Genetic bais of haemoglobinopathies

Unit-4 A. Behavioural genetics

1. Influence of single gene defects on behaviour
2. Nature and nurture
3. Genetics of mental retardation

4. Genetics of intelligence

5. Behaviour and chromosomal anomalies

B. Somatic Cell Genetics

1. Cell and tissue culture, Somatic cell lines

2. Cell hybridisation

3. Mapping of genes

Unit-5 Microbial Genetics

1. Organization of prokaryotic genome, single stranded DNA phages, RNA phages

2. Conjugation

3. Transduction

4. Transformation

5. Lytic and lysogenetic phage morphogenesis

6. Plasmids - characteristics, replication

7. S40 and Adenovirus - life cycle and gene expression

Z-306 SPECIAL PAPER - I PRACTICALS

GENETICS

1. Meiotic chromosome preparation from rat/mice bone marrow

2. Meiotic chromosome preparation from rat/mice testis

3. Banding techniques - Mice/rat chromosome

(a) G - band

(b) C - band

Suggested Readings

1. Ayala F J and Kiger J A (1984) Modern Genetics, 2nd Ed. Benjamin/Cumming Publ.

2. Bostock C J and Summer A T (1980) The Eukaryotic Chromosome, North-Holland Publ.

3. Bradbury E M Macleen N and Matthews H R (1981) DNA, Chromatin and chromosomes, Blackwell Sci. Publ.

4. Hsu T H (1970) Human Mammalian Cytogenetics

5. Lewin B (1990) Genes. 4th Ed. John Willey & Sons

6. Watson J D et al (1987) Molecular Biology of the Gene(4th Ed.) Benjamin/Cumming Publ.

7. Strickberger M W (1985) Genetics. Macmillan Pub. Co.

Z-305

SPECIAL PAPER - I

F. LIMNOLOGY

Unit-1

1. Introduction, concepts, definitions and significance. Palaeolimnology and applied limnology
2. Freshwater resources and impact of demophoric growth
3. Lacustrine and riverine resources of India
4. Limnology in India, its present status and future perspectives

Unit-2

1. Water as an environment and its properties. Hydrological cycle and global water balance
2. Diversity of aquatic biotopes, characteristic features of lentic and lotic ecosystems
3. The river continuum concept
4. Lake basins : their origin and germophology

Unit-3

1. Water movements : kinds of water movements, surface waves, internal water movements, circulation caused by thermal bars, currents generated by river influents
2. Light as a limnological factor, nature of light, factors affecting light penetration, color of natural waters
3. Temperature : distribution of heat and water temperature thermal stratification. Meromixis and its causes

Unit-4

1. Oxygen : sources of oxygen, factors affecting solubility of dissolved oxygen in freshwater. Vertical distribution of oxygen and lake typology. Horizontal distribution and dial cycles
2. Hypolimnetic oxygen deficits and productivity
3. Carbon dioxide, alkalinity and pH. Fate of carbon dioxide in water. Factors contributing to alkalinity
4. Vertical distribution of total inorganic carbon and pH Hypolimnetic carbon dioxide accumulation as an index of productivity

Unit-5

1. Ionic composition and salinity, sources of ions and specific conductivity
2. Distribution of conservative and dynamic ions in freshwater (various cations and anions). Cation/anion ratios

3. Biogeochemical cycling of major nutrients : Phosphorus and Nitrogen cycles in aquatic ecosystems

4. Biogeochemical cycling of essential micronutrients : Sulphur, Silica and Iron Cycles

Z-306 SPECIAL PAPER - I PRACTICALS

LIMNOLOGY

1. Measurements of pH and specific conductivity of various water samples
2. Estimation of total solids and total dissolved solids
3. Estimation of dissolved oxygen concentration in various aquatic ecosystems
4. Estimation of Phenolphthalein and Methyl orange alaklinities of various water samples
5. Estimation of free Carbon dioxide contents of water samples
6. Estimation of Total Hardness
7. Estimation of Calcium Hardness and calculation of Magnesium Hardness
8. Estimation of Chloride concentrations in clean and polluted waters
9. Estimation of Sulphate by turbidimetric method
10. Estimation of Phosphate concentration
11. Estimation of Nitrate concentration
12. Observation on light penetration and thermal profile of a lake or a reservoir
13. Observation on diurnal variations in physico-chemical factors in a water body
14. Analysis of the above physico-chemical factors in selected water bodies in and around Shillong and comparison of their water quality

Suggested Readings

1. Cole B A (1975) Textbook of Limnology, Mosby
2. Goldman C R and Horne A J (1983) Limnology, McGraw-Hill International Book Company
3. Hutchinson G E (1976) A Treatise of Limnology, Vol. I & II & III John Willey & Sons, Inc.
4. Moss B (1988) Ecology of Freshwaters, Man and Medium, Blackwell Scientific Publications.
5. Schwoerbel J (1972) Methods of Hydrobiology (Freshwater Biology), Pergamon Press.

Z- 305

SPECIAL PAPER-I
G. PARASITIC HELMINTHOLOGY

Unit - 1

1. Life cycle and biology of flukes
Monogenea:Gyrodactylus, Polystoma, Diplozoon
Trematoda:Liver flukes - Fasciola, Clonorchis, Dicrocoelium:
Intestinal flukes - Fasciolopsis,Heterophyes:
Lung flukes - Paragonimus

2. Life cycle and biology of cestodes :
Hymenolepis, Dipylidium, Diphyllobothrium, Spirometra

Unit - 2

1. Life cycle and biology of nematode of cestodes :
Trichinella, Trichuris, Strongyloides, Enterobius, Toxocara, Hookworms, Filaria Worms - Brugia, Onchocerca, Loa.
2. Larva migrans
3. Life cylce and biology of Acanthocephala:
Macracanthorhynchus hirudinaceus

Unit - 3

1. Egg : types, structure and formation of eggshell, hatching in helminth parasites
2. Cerceria : types, encystment
3. Metacercaria :types, excystment
4. Metacestode : types

Unit - 4

1. Moulting and exsheatment of nematode larvae
2. Microfilaria : types
3. Parasitic transmission : routes and modes, host finding and penetration mechanisms, adaptations for transmission, salient patterns exhibited among helminth parasites

U nit - 5

1. Factors affecting growth and establishment of parasites within the host : crowding effect : interspecific interactions - effect of host 's age, nutrition, sex, hormones, mode of living
2. Parasite -induced effects : modifications of host-growth factors, effect on behaviour, parasitic castration: Pathogenicity

Z-306 PARASITIC HELMINTHOLOGY - I PRACTICALS

1. Preparation of whole mounts and study of helminth parasites (locally available)

2. Faecal examination : by direct smear, salt floatation techniques;indentification of various egg types (of trematodes, cestodes and nematodes) in the sample

3. Use of Baermann 's Apparatus for recovery of active larvae from faecal/soil samples

4. Preparation and/or study of various larval forms : intramolluscan stages of trematodes,cestode and nematode larvae

5. Specific staining techniques to reveal the nature of egg shell in trematodes .

6. Histopathology of helminth infection from prepared slides

7. Microtomy of host's infected tissue with parasite in in situ, for studying histopathology

8. Morphometry of diagnostic stages of infection (eggs/larvae)

Suggested Readings

1. Arme C and Pappas P W (1983) Biology of the Eucestoda, Vol. I & II, Harcovit Brace Jovanovich.

2. Chitwood R G and Chitwood M B (1974) Introduction Nematology, Univ. Park Press.

3. Cox F E F (1982) Modern parasitology,Blackwell 's Scientific Publications.

4. Dawes, Ben(1968) The Trematoda, Cambridge Univ.Press.

5. Erasmus D A (1972) Biology of Trematodes, Edward Arnold.

6. Garcia L S & Ash L A (1979) Diagnostic Parasitology Clinical Laboratory Manual, Mosby.

7. Lee D L and Atkinson (1975) The Physiology of Nematoda, Macmillan Press Ltd.

8. Maggenti A R (1981) General Nematology, Springer Verlag.

9. Mehlhorn H (1988) Parasitology in Focus-Facts Trends, Springer Verlag.

10. Noble E R and Noble G A (1982) Parasitology, the Biology of Animal Parasites, Lea & Febiger.

11. Schmidt G F (1989) Foundations of Parasitology, Mosby.

12. Smith J D and Halton D W (1983) The Physiology Trematodes, Cambridge Univ. Press.

13. Smith J D and McMannus D P (1980) The Physiology Cestodes, Cambridge Univ. Press.

14. Manual of veterinary parasitology,Laboratory techniques -H.M.S.O. Tech.Bulletin No.18 (1977)

15. Advances in Parasitology - Vols. 1 to 30,Academic Press.

Z-401 BIOSYSTEMATICS AND EVOLUTION
BIOSYSTEMATICS

Unit - 1

1. Definitions and Perspectives; Taxonomy, Systematics, Biosystematics, Classification, nomenclature, taxon, phenon and category etc.
2. Application of systematics to other biological fields. The task of taxonomists
3. Historical resume of Taxonomy
4. Trends in Biosystematics: Various conventional and newer approaches
5. Material basis of Biosystematics :Characters, geographical records and ecological data

U nit - 2

1. Dimensions of speciation : Types of lineage changes, production of additional lineages. Mechanisms of speciation in Panmictic and Apomictic lineages
2. Species concepts : Typological, nominalistic, phenetic and biological concepts. Limitations in application of Biological species concept
3. Subspecies and other infraspecific categories
4. Biological classification: its importance and various theories
5. The hierarchy of categories and the higher taxa

U nit - 3

1. Taxonomic characters : different kinds of characters
2. Taxonomic procedures : taxonomic collections, curating and process of identification
3. Taxonomic keys : various kinds of keys and their applications
4. Taxonomic publications : different kind of publications
5. Process of Typification and Zoological types
6. International code of Nomenclature : operative principles of nomenclature. Interpretation of various rules of nomenclature. Formulation scientific names of various taxa

EVOLUTION

U nit-1

1. Theory of Natural selection
2. Synthetic theory
3. Genetic variation, Genetic polymorphism
4. Genetic equilibrium
5. Notion of selectively neutral mutation (Kimura)
6. Evolution by gene duplication

Unit - 2

1. Modes of speciation; Allopatric, Sympatric, Parapatric, Stasipatric speciation.
2. Implication of geographic distribution for modes of speciation, Zoogeographical realms
3. Isolating mechanisms and their role in evolution
4. The founder principle, Bottleneck effect and Genetic drift as factors in speciation

Unit - 3

1. Origin of life, evolutionary history of proteins and the concept of molecular clock, molecular drive
2. Evolution history of neutral integration
3. Evolution of man

Z-402 BIOSYSTEMATICS PRACTICALS

1. Identification and classification of commonly available freshwater fishes of North-Eastern region
2. Qualitative enumeration of various groups of aquatic micro-organisms of Shillong and its adjacent areas
3. Observations on species composition of the studied groups in various aquatic biotopes and analysis of faunal similarities (vide Sorenson Index).
   Record of morphometric and ecotypic or cyclomorphic variations in selected species
4. Identification of commonly available fish species
5. Identification of commonly available local species of amphibians
6. Idenfication of common species of decapod Crustaceans (Prawns) of North-Eastern region
7. Extraction and study of representatives of various groups of soil micro-invertebrates

8. Preparation of taxonomic keys for identification of the studied organisms

9. Visit to local regional station of Zoological Survey of India, Shillong to learn various techniques of collection and curating and to study the deposited collections

10. Collection, identification and submission of various species of invertebrates and vertebrates of this region.

Suggested Readings

BIOSYSTEMATICS

1. Blackwelder R E (1967) Taxonomy. A Text and Reference Book, John Wiley & Sons.

2. Jaffery C (1980) Biological Nomenclature, Oxford & IBH Publishing Company.

3. Mayer E (1980) Principles of Systematic Zoology, Tata McGraw Hill Publishing Company Ltd.

4. Ross H H (1974) Biological Systematics, Addison-Wesley Publishing Company, Inc.

5. Simpson C G (1961) Principles of Animal Taxonomy, Columbia University Press.

EVOLUTION

1. Ayala F J (Ed) (1976) Molecular Evolution, Sinaver Associates Sunderland.

2. Baker J R (Ed) (1974) Evolution: The Modern Synthesis (3rd edition) George Allen & Unwin.

3. Ferguson A (1980) Biochemical Systematics and Evolution, Blackie & Sons.

4. Goodman M (Ed) (1982) Macromolecular Sequences in Systematics and Evolutionary Biology, Plenum Press.

5. Ohno S (1973) Evolution by Gene duplication.

Z-403 TECHNIQUES IN BIOLOGY AND BIOMETRICS

Unit-1 Methods in Cell Biology and Tracer Techniques

1. Microscopy : Light, Phase-contrast, Fluorescent and Electron microscopy
2. Flow Cytometry, Spectrophotometry, Spectro-fluorometry
3. Cell and tissue culture
4. Chromosome Bandings
5. X-ray diffraction;NMR & ESR spectroscopy
6. Principles and application of tracer techniques, Autoradiography, Radioimmunoassay
7. Immunological Techniques-Immuno diffusion, Immunoelectrophoresis, ELISA

Unit-2 Molecular and Biochemical Techniques-I

1. Separation of various sub-cellular organelles-centrifugation
2. Chromatography
3. Electrophoretic techniques
4. Protein sequencing

Unit-3 Molecular and Biochemical Techniques - II

1. Southern, Northern and Western blotting techniques
2. Sequencing of Nucleic acids
3. Principles and application of Nick-translation, In situ Hybridisation
4. Dot and slot blots
5. Polymerase Chain Reaction
6. Pulse-fiedl Gel Electrophoresis
7. Restriction fragment length polymorphism
8. DNA-foot printing
9. DNA-finger printing

Unit-4 Biometrics-I

1. Statistics and its application in Biology
2. Sampling, Sampling rise and errors
3. Skewness and kurtosis
4. Probabability
5. Distribution : Normal, binomial, poison and Frequency distribution

Unit-5 Biometrics -II

1. Measure of Central tendency - Mean, Median and Mode
2. Statistics of dispersion, Coefficient of variation
3. Standard error and standard deviation
4. Tests of statistical significance-t-test, X^2- test
5. Analysis of variance, F-test
6. Simple correlation and regression.

Z-404 TECHNIQUES IN BIOLOGY AND BIOMETRICS PRACTICALS

BIOMETRICS

1. To make line diagram, bar diagram, frequency table, column diagram, frequency polygob, histogram, ogives, etc., from a given data
2. Computation of averages, quartiles, mean deviation, standard deviation, coefficients of skewness and kurtosis
3. Computation of coefficients of correlation
4. Regression analysis and fitting straight line for a bivariate data
5. Student's 't' test, Chi-square test and snedecor's test
6. Computation of ANOVA for one-way and simple two-way classified data.

STUDY TOUR

1. To visit research laboratories and institutes
2. For faunistic collections from different habitats
3. Submission of collected specimens and field report

Z-405 SPECIAL PAPER - II

A. CELL BIOLOGY AND IMMUNOLOGY

Unit-1

1. Evolution of immune system
2. Innate and acquired immunity
3. Haematopoietic system, cells and organs of immune system
4. T-cells origin, maturation, characterization and functions
5. B-cells origin, maturation, characterization and functions

Unit-2

1. Antigens : concept of determinants, haptens, proteins, carbohydrates and nucleic acids as antigens
2. Concept of cell mediated immunity
3. B, macrophage and T-cell interaction, antigen presentation
4. Major histocompatibility complex in humans and mouse
5. Class I and Class II molecules, MHC genes, Immune response genes

Unit-3

1. Primary and secondary immune response
2. Molecular structure and function of immunoglobulins -allotypes, isotypes and idiotypes
3. Theories of antibody formation
4. Ig genes and antibody diversity
5. Monoclonal antibodies

Unit-4

1. Antigen-antibody reaction-affinity, avidity, forces
2. Precipitation, immunodiffusion, immunoelectro-phoresis biological significance and pathology of complement system, agglutination, RIA and ELISA
3. Regulation of immune response
4. Cytokines and lymphokines - interleukins
5. Interferons-types, structure and mechanism of action

Unit-5

1. Immunity to infectious agents-virusses, bacteria, tunours and parasites
2. Immediate and delayed type hypersensitivity
3. Immunodifieiency disorders, AIDS

Z-406 SPECIAL PAPER-II PRACTICALS
CELL BIOLOGY AND IMMUNOLOGY

1-4 Raising antisera in rabbit
Immunodiffusion studies - single, double and radial staining and drysing of the gel

5-6 Immunoelectrophoresis

7 Collection and counting of peritoneal exudate cells from mice treated with or without thioglycolate

8. Preparation of blood smear, staining and identification of cells of immune responses

9-10 Capillary migration inhibition studies

11-12 Polyacrylamide gel electrophoresis of serum from normal and pathological hosts

13. Separations of leukocytes by Ficoll gradient

Suggested Readings

1. Roitt I, Brostoff J, Male D (1985) Immunology, Gower Medical Publishing.

2. Roitt I (1984) Essential Immunology, 5th Edition, Blackwell Scientific Publication.

3. Cooper E L (1982) General Immunology, Pergamon Press.

4. Zaleski M B et al (1983) Immunogenetics, Pitman Publishing Inc.

5. Stites D P et al (1987) Basic and Clinical Immunology, Lange Medical Publications.

6. Hudson L and Hay F C (1980) Practical Immunology, Blackwell Scientific Publications.

7. Talwar G P (1983) A handbook of practical immunology, Vikas Publishing House Pvt. Ltd.

8. Bellanti J (1985) Immunology, W.B.Saunders & Co.

9. Weir D M (1985) Handbook of immunology, Blackwell Scientific Publications.

Z-405 SPECIAL PAPER-II
B. DEVELOPMENT BIOLOGY

Unit-1 Primordial Germ Cells

Origin and differentiation in Caenorhabditis, Amphibia (Urodela, Anura), Drosophila

Unit-2 Teratogenesis

1. Types of abnormalities - genetic and environmental; pleiotropism
2. Teratogens and their specificity; phenocopies
3. Dose effect and stage sensitivity of developing tissues to teratogens

Unit-3 Molecular Biology of Development

1. Genomic equivalence and exceptions to it
2. Control of development by transcriptional regulation of gene expression
3. Control of development by translational regulation of gene expression
4. Control of development by post-translational regulation of gene expression

Unit-4 Genetic control of Development

1. Chimaeras
2. Gynandromorphs
3. Genetic nosaics in Drosophila
4. Mutations affecting organogenesis; programmed cell death.

Unit-5 Theories and Models - The Problems of Early Development

1. Gradient models of embryonic induction
2. Cell states
3. Thresholds and repeated patterns

Z-406 SPECIAL PAPER - II PRACTICALS
DEVELOPMENTAL BIOLOGY

1. Study of germ cells in frog
2. Effect of UV irradiation on anuran germplasm
3. Effect of lithium chloride on the normal development anuran and avian embryos
4. Critical period and dosage sensitivity
5. Study of changes in the proteins formed development
6. Study of some mutants in Drosophila
7. Use of Spratt culture or Nill's techniques culture in chick

Suggested Readings: As mentioned in Special Paper -I

Z-405 SPECIAL PAPER-II

C. ENDOCRINOLOGY AND REPRODUCTIVE PHYSICLOGY

Unit-I Fertilization and implantation

1. Fertilization
2. Collection and preservation of gametes
3. Tests for sperm viability and function
4. Induced ovulation
5. In vitro fertilization and embryo transfer
6. Plantation and its regulation, Test of Pregnancy
7. Placental hormones, nature, function, regulation of secretion

Unit-2 Parturition and Lactation

1. Regulation of parturition
2. Endocrinology of Lactation
3. Structure of the mammary gland; hormonal regulation of the development and differentiation of the mammary gland
4. Factors regulating the initiation and maintenance of lactation
5. Ovarian and adrnal function during lactation

Unit-3 Testicular and Ovarian disorders

1. Phases of normal testicular function
2. Assessment of testicular function
3. Abnormalities of testicular function
4. Ovarian activity and breeding cycles
5. Morphological and functional changes in ovary with development and aging
6. Tests of ovarian dysfunction
7. Syndromes of ovarian dysfunction

U nit-4 Regulation of fertility

1. Principles and techniques of fertility control in males
2. Principles and techniques of fertility control in females
3. Hormonal contraception
4. Intrauterine contraception
5. Management of infertility
6. Reproduction and senescence

U nit-5 Designing Experiments for the study of Breeding and fertility

1. Care and breeding of laboratory animals
2. Surgical techniques in the study of mammalian reproduction
3. Principles of Bio-assay and their application
4. Techniques in Radio-immunoassay, radio-receptor assay and enzyme immunoassay
5. Use of polyclonal and monoclonal antibodies in the study of reproduction
6. Immuno-contraception; gamete antigens, hormonal antigens

Z-406 SPECIAL PAPER-II PRACTICALS

1. Study of suprovulation in albino rat/mice
2. Sperm count and motility
3. Effects of antifertility drugs on sperm count and motility
4. Effect of oxytocin on mammary gland using lactating rat
5. Effect of oxytocin on uterine contraction
6. Effect of catecholamines on vas deference contractility
7. Estrogen bioassay using immature rat/mice
8. Bioassay of progesterone by measures of endoxetrial proliferation
9. RIA for any hormone for which facilty exists

Suggested Readings: As mentioned in Special Paper -I

Z-405 SPECIAL PAPER-II

D.ENTOMOLOGY

Unit-1 Integument: Structure and physiology; synthesis of chitin, sclerotization and tanning in cuticles

Unit-2 1. Insect nutrition: digestive system, anatomy physiology of digestion and assimilation of nutrients

2. Excretory system: structure of excretory organs, Physiology of excretion; synthesis of Uric acid

3. Circulatory system: anatomy and physiology, biochemistry of insect haemolymph, haemocytes and their function

Unit-3 1. Respiratory system: structure and physiology

2. Intermediary Metabolism: Glycolysis, Glycerophosphate shuttle, trehalose biosynthesis, synthesis of polyols and their function

3. Muscular system: biochemistry of insect flight

Unit-4 Nervous system: structure and physiology, sense organs and sensory receptors
Reproductive system; structure and physiology synthesis of vitellogenin

Unit-5 Endocrine glands: hormones and their biosynthesis pheromones
Insect growth, metamorphosis
Diapause
Insect - plant relationships and isect vector-host interactions

Z-406 SPECIAL PAPER-II PRACTICALS

ENTOMOLOGY

1. Study of major agricultural and horticultural pests of North-Eastern Region
2. Techniques of formulation and application of insecticides.
3. Study of the nervous system of insects
4. Study of the reproductive system of insects
5. Ecological experiments on the effects of insecticides on growth and metamorphosis of any availavle (Cockroach, Silkworm or Tribolium)
6. Endorcinological experiments to study the effects insect hormones on development, reproduction etc. on commonly available insect

Suggested Readings

1. Baement J W L, Treherne J E & Wigglesowth V B (1969) Advances in Insect Physiology, Vol.1-10, Academic Press.
2. Candy J & Kilby B A (1975) Insect Biochemistry and Function, John Willey and Sons.
3. Englemann F (1970) The physiology of Insect Reproduction Perganon Press.
4. Gilmour D (1964) The Biochemistry of Insects, Academic Press
5. Jacobson M (1972) Insect Sex Pheromones, Academic Press.
6. Kerkut G and Gilbert L I (1985) Comprehensive Insect Physiology Biochemistry and Pharmacology, Vol.1-13, Pergamon Press.
7. Slama K, Romanul K and Sorm K (1974) Insect Hormones, Springer-Verlag.
8. Wigglesworth V E (1973) The Principles of Insect Physiology, Chapman and Hall.

Z-405

SPECIAL PAPER - II
E. GENETICS

Unit - 1 Regulation of Gene Expression

1. RNA polymerases, promoters, cis-elements and transacting factors
2. Termination and antitermination
3. Lytic cascade and lysogenic repression
4. Tissue specific gene expression in eukaryotes
5. Regulation at transcriptional and translational level
6. Antisense RNA
7. Organisation of active chromatin

Unit - 2 Differentiation

1. Differential gene function during development
2. Homeo boxes-significance in differentiation
3. Mutants affecting major developmental patterns in Drosophila
4. Teratogenesis

Unit - 3 Recombinant - DNA Technology

1. Enzymes used in molecular cloning
2. Cloning vectors, Expression and Shuttle vectors
3. Genomic and cDNA libraries
4. Identification of recombinant clones
5. Gene cloning in eukaryotes
6. Gene transfer in animals and transgenic animals

Unit - 4 Cancer

1. Monoclonal origin
2. Differences of normal and cancer cell and types of cancer
3. Cell transormation and factors for cell proliferation
4. DNA and RNA tumour viruses
5. Concept of oncogenes and their role in cancer
6. Chromosomal basis of human cancer

Unit - 5

A. Mobile Genetic Elements
1. Transposable elements in Prokaryotes
2. Transposable elements in Eukaryotes
3. Salmonella phase variation
4. Retroposon

B. Gene Amplification
1. Mechanism
2. Ribosomal DNA in human and Drosophila

Z-406 SPECIAL PAPER- II PRACTICALS
GENETICS

1. Study of chromosome aberrations induced by mutagens and/or radiation - Rat/mouse chromosomes
2. Differential staining of sister chromatid using BrdU - Rat/mouse chromosomes
3. Leucocyte culture techniques from Peripheral blood of human
4. Electrophoretic studies of isozymes

Suggested Readings

1. Berg P and Singer (1990) Genes and Genome
2. Davidson E A (1986) Gene Activity in Early Development, Academic Press.
3. Glovers D M (1985) Gene cloning, Vol.I, IRL Press.
4. Hames B D and Glover D M (1988) Transcription and splicing, IRL Press.
5. Lewin B (1990) Gene, 4th Ed. John Willey & Sons
6. Watson J D et al. (1987) Molecular Biology of the Gene, 4th Edition, Benjamin/Cummings Publ.
7. Williamson R (1981) Genetic Engineering 2, Academic Press.
8. Shapiro J A (1983) Mobile Genetic Elements, Academic Press.

Z-405 SPECIAL PAPER -II
F.LIMNOLOGY-II

Unit-1

1. Freshwater biocoenosis : general introduction and functional classification
2. Plankton, Nekton, Neuston, Periphyton and Benthos
3. Major groups of freshwater organism : constituents of bacteria, aquatic fungi, different groups of algae, macrophytes, protozoans, Rotifers, Micro-crustaceans, other invertebrate groups and fishes, etc.
4. Techniques for qualitative and quantitative sampling of aquatic communities in lentic and lotic biotopes.

Unit-2

1. Running -water communities ;salient features of composition of biota in slow-flowing and fast-flowing waters, adaptations to lotic environs
2. Standing - water communities : zones of life, general features of composition of littoral and limnetic communities
3. Ground-water communities : introduction to ground-water ecosystems, general features of biocoenosis, distribution and ecology.

Unit-3

1. Trophic dynamics in freshwater ecosystems : food-chains in lentic and lotic environs, energy flow trophic relationships
2. Primary production : general concepts and various methods of estimation of primary production of macrophytes, phytoplanktor and periphyton
3. Secondary production : basic concepts and various methods of assessment of secondary production
4. Ecological succession in aquatic ecosystems

Unit-4

1. Eutrophication : causes, consequences and management measures, its impact on biotic communities, algal bloom and bio-indicators.
2. Cyclomorphosis in various aquatic organisms, its causes and adaptative significance
3. Water use and human health-impact of water borne diseases
4. Inland water resources and aquaculture : importance, different practices and perspectives for production of fish and other aquatic organisms

Unit-5

1. Waste waters :general characteristics, quality criteria for their utility
2. Mechanical, biological and chemical treatment of domestic waste waters
3. Sludge treatment and disposal
4. Waste stabilization ponds : general features and ecological characteristics.

Z-406 SPECIAL PAPER -II PRACTICALS
LIMNOLOGY

1. Qualitiative analysis of Phytoplankton communities of water bodies in and around Shillong

2. Qualitative analysis of various groups of Zooplankton occurring in water bodies in and around Shillong

3. Preparation of camera lucida drawings of various planktonic organisms and record of their morphometric measurements

4. Qualitative analysis of littoral aquatic communities with reference to their association with different aquatic macrophytes.

5. Qualitative analysis of biotic communities in ephemeral biotopes with special references to rice-field ecosystems.

6. Comparison of composition of littoral and limnetic communities in selected water bodies

7. Observations in quantitative abundance of different phytoplankton and percentage contributions of various groups.

8. Observations in quantitative abundance of various zooplanktonic organisms and percentage contributions of different groups

9. Calculation of species diversity of phyto-and zooplanktonic communities in various water bodies

10. Examination of lotic biotic communities in hill stream

11. Estimation of primary production by light and dark oxygen bottle method in selected water bodies

Suggested Readings

1. Cole G A (1975) Textbook of Limnology, Mosby.

2. Goldman C R and Horne A J (1983) Limnology, McGraw-Hill International Book Company.

3. Hutchinson G E (1976) A Treatise of Limnology, Vol.I & II & III, John Willey & Sons, Inc.

4. Moss B (1988) Ecology of Freshwaters, Man and Medium, Blackwell Scientific Publications.

5. Schwoerbel J (1972) Methods of Hydrobiology (Freshwater Biology), Pergamon Press.

Z-405 SPECIAL PAPER -II
G.PARASITIC HELMINTHOLOGY

Unit - 1 Structure and function of host-parasite interface

1. Tegument in Monogenea, Trematoda, Cestoda
2. Cuticle; hypodermis, somatic musculature and Pseudocoelom in nematodes
3. Body wall in Acanthocephala

Unit-2
1. Feeding and nutrition : gastrodermis in trematodes; stomodeal variations and gastrodermis in Nematoda; nutriton and digestion
2. Energy sources, carbohydrate metabolism
3. Metabolic specializations and adaptations in parasites

Unit - 3
1. Excretion and osmoregulation
2. Parasitic maturation and reproduction :asexual, sexual, synchrony with the host
3. Sense organs, nervous coordination
4. In vitro cultivation and differentiation of helminth parasites.

Unit - 4
1. Immune system of vertebrates on relation to parasitic infections; immunity to Schistosoma,hydatid, trichinella and filarial infections; evasive mechanisms in parasites
2. Probe technology for parasitic diagnosis :DNA probe; serodiagnostic methods

Z-406 PARASITIC HELMINTHOLOGY- II PRACTICALS

1. Histology of a trematode, cestode, nematode and acanthocephalan representative
2. Preparation and study of anterior extremity and stomadaeum of various nematode species
3. Culture of miracidia from fluke eggs; effect of temperature and pH on development;effect of light on hatching
4. Culture of Ascaris/Ascaridia eggs to infective stage: effect of temperature on development ; physiological hatching of infective eggs in vitro
5. Serum analysis : globulin content in infected and non-infected hosts.
6. Haematological analysis : WBC count (total and differential) in normal and infected hosts
7. Antigen - antibody reaction: demonstration, immunodiffusion
8. Prevalence and intensity of infection:assessment from autopsied hosts, assessment of worm burden by eggs count per gram (EPG) of faeces.

Suggested readings : (in addition to those listed with Parasitic Helminthology-I)

1. Allen S (1988) Biology of Parasitism - A Molecular a nd Immunological Approach, Allen Press.

2. August J T (1984) Molecular Parasitology, Academic Press, INc.

3. Barret J (1980) Biochemistry of Parasitic Helminths, Macmillan Publishers Ltd.

4. Barriga O O (1981), The Immunology of Parasitic Helminths, Univ. Park Press.

5. Trager W (1986) Living together : The Biology of Animal Parasitism, Plenun Press.

Request of same teachers of Pachhunga University College for appointment as supervisors of Ph.D Candidates.

During the visit of the Vice-Chancellor to Mizoram Campus, some lecturers of the Pachhunga University College, Aizawl has raised the question for their appointment as supervisors for Ph.D. candidates in Geology.

But as per Ordinance OC 4 (1) clearly states that the supervisor to guide and supervise the work of the candidate shall be a teacher of the University.

The matter was placed to the Deans' Committee which a decision has been made to refer the matter of appointment the teachers of the Pachhunga University College as co-supervisor for Ph.D. students to the Academic Council for decision.

In view of above the matter is placed to Academic Council for decision.

(1) Request of two candidates of M.Sc Bio-Chemistry for repeating a course, beyond the limit Provided in the Ordinance.

Two candidates namely Grist Mary Nongkhlaw and Nangkroi Bthuh of the Department of Bio-Chemistry had completed their IVth semester course by April,1991. By August, 1991 theu submitted their join petition to request special permission to repeat one course of the First Semester which they could not clear even at the second chance. The case was referred to the Dean's Committee which recommended that the matter be referred to the School Board concerned.

The School Board suggested that the matter should be discussed by the Academic Council. An extract of the minutes of the School Board is reproduced below :

" VIII: The case of G.M.Nongkhlaw and N.Bthuh of Bio-Chemistry Department for re-peating the M.Sc course(not cleared twice) was considered. The Board was apprised that maximum chances permitted to clear a course are only two and the above two candidates have already exhausted them. Since the matter was referred to the Board by the Dean's Committee and as the candidate belong to the School of Life Sciences, the Board was of the opinion that in view of the fact that University has already allowed both the candidates to appear in the Examination of the course 3rd time, the result should be declared on compassionate grounds without creating any precedence. Further, on the question of re-peating a course as a policy, the Board did not want to express opinion and felt that the matter being of wider implication it should be discussed by the Academic Council."

The matter is accordingly placed before the Council for consideration.

5:5:2(1)

(i) Equation of the M.Ed Degree with M.A (Education) Degree- Request of Mrs Irene Zopari Sailo and the recommendation of the School Board(Education).

In its 42nd meeting held on 27th,June'1991, the Academic Council considered the request of Mrs.Irene Zopari Sailo for equation of her M.Ed Degree with M.A.(Education) Degree. The Council passed the following resolution :

" AC:42:91:5:05:(iv)- The Council discussed the subject in detail and RESOLVED that a two year M.Ed degree could be treated as equivalent to a Post-Graduate degree provided the number of years spent from P.U. to the obtaining of the degree and the papers approved at the M.Ed are equivalent. The School Board in Education may look into these aspects and submit their recommendations."

In view of the above decision of the Council, the School Board of Education considered the matter in its meeting held on 24th,April'1992 and recommended that the two year M.Ed and the M.A.(Education) degree of the North-Eastern Hill University be treated as equivalent, the number of years of study involved and the number of courses studied being the same.

The matter is placed before the Council for consideration.

(iii) Certain points regarding evaluation, re-evaluation and improvement of Honours examinations results - Item from Dr. R.K.Dutta.

In the enclosed letter (Annexure 'A') Shri R.K. Dutta, Lecturer, Shillong College has raised certain points regarding evaluation, reevaluation and improvement of Honours examination results. Since only the brief outlines of the points have been given without much elaboration, the letter is placed before the Academic Council for consideration.

5:5:3(2)

COPY

Annexure 'A'

The Registrar
North Eastern Hill University
Shillong

Dated Shillong the 20th July, 1992.

Sir,

The following matters may kindly be included in the agenda of the 44th Academic Council Meeting to be held on the 7th August, 1992.

1. Evaluation of answer script and examination result, This is essential in view of this years' delay in the result.

2. Re-evaluation.

   The present restrictions subject a student into a peculiar situation. Particularly meritorious students are deprived of justice.

3. Improvement of Honours result.

   While Pre-University and Degree (Pass) students get such facilities, there is no reason why honours students should not get this opportunity.

Thanking you,

Yours faithfully,

Sd/-

(R. K. Dutta)
Shillong College

(i) Proposal of the Centre for Literary and Cultural Studies for starting a Certificate and Diploma Course in Folkloristics.

In its meeting held on 2.6.90, the Advisory Committee of the Centre for Literary and Cultural Studies had decided for review of the Course Structure of the Certificate Course and also for introduction of a Diploma Course. The Advisory Committee authorised the Steering Committee to constitute a Committee for the purpose.

The Course Structure for the Certificate Course and Diploma Course was prepared by a Committee and the structure was approved by the Steering Committee in its meeting held on 1.5.92. The Course Structure was also considered by the Local School Board of Social Sciences in its meeting held on 14.5.92 and the Board approved the course content with the suggestion that course 6 should be entitled "Folklore of North-East India - 2 with Special reference to Meghalaya, Mizoram and Nagaland.

The Centre has now submitted the Course Structure for the Certificate and Diploma Courses duly modified as suggested by School Board, for consideration of the Academic Council. The modified Course Structure is placed at Annexture-"A" for consideration of the Council.

ANNEXURE-'I'

CENTRE FOR LITERARY AND CULTURAL STUDIES
NORTH-EASTERN HILL UNIVERSITY

PROPOSAL FOR
CERTIFICATE AND DIPLOMA COURSE IN FOLKLORISTICS

Introduction

The Centre for Literary and Cultural Studies, NEHU, has been conducting successfully a Certificate Course in Folkloristics (One Semester Course - approved by the Academic Council in 1987) since 1988. Student response to the course has been quite encouraging. Keeping this in view the Advisory Committee of the Centre decided to recommend the upgrading of the existing Certificate Course to a Diploma Course. The Steering Committee of the Centre subsequently constituted a Course Drafting Committee with three experts and the faculty members of CLCS. The experts were Prof.Birendranath Datta of the Deptt. of Folklore, Gauhati University, Dr. Jawaharlal Handoo of the Forklore Unit of Central Institute of Indian Languages, Mysore and Prof.J.B. Bhattacharjee of the Deptt. of History, NEHU. The Drafting Committee met on 2 April 1992 and prepared the Course Structure (appended to this note) which was subsequently approved by the Steering Committee in its meeting on 1 May,1992.

Objective

Folkloristics is the scientific study of folklore. It included more than simply the collection of tales etc. and antiquarian reporting. It has now grown to be a rigorous intellectual discipline that includes application of theory and method to the study of material of folklore.

With appropriate scholastic training in theory and methods of folkloristics, a scholar can contribute, through research on folklore, to studies in other social science disciplines, such as History, Anthropology, Philosophy. The literary potential of folklore studies has long been accepted and many of the language departments of Indian Universities have included local folk literature in their syllabi. It's potential for use in studying social formations is also being increasingly recognised.

contd..../.....

In North-East India with its rich folk cultural heritage, such a course is deemed to be worthwhile in studying indigenous literatures and cultures. It is also expected to help in generating an awareness among students and scholars about the cultural heritage and true history of the people of the region.

Keeping this in view, the Centre for Literary and Cultural Studies proposes to follow up the existing Certificate Course with a Diploma Course in Folkloristics. The course will provide enhanced perspective in the scientific study of the folklore material with exposure to concepts and methods and familiarise the students with the rich treasure of folklore materials of North-East India.

Pattern

The course will be a one year course devided into two semesters. The 4 courses offered in the first semester will lead to a Certificate and completion of the first part of the Diploma Course. Successful candidates in the first semester examination will be eligible for Part II of the Diploma Course conducted in the second semester which will lead to the award of Diploma in Folkloristics. The entire course of eight papers have therefore been divided into two parts - 1st and 2nd semester with four papers in each of the two semesters.

Eligibility

Any student with a Bachelor degree will be eligible for offering the course. Preference will, however, be given to students with degree in social science disciplines and languages.

CENTRE FOR LITERARY AND CULTURAL STUDIES
NORTH-EASTERN HILL UNIVERSITY

CERTIFICATE AND DIPLOMA COURSE IN FOLKLORISTICS

FIRST SEMESTER

CERTIFICATE COURSE AND DIPLOMA COURSE (PART I)

COURSE 1 : INTRODUCTION TO FOLKLORISTICS

Objectiove : The course will initiate the students to the theories and methods of the Science of Folklore.

Contents : 1. What is Folklore 2. Folklore and Folklife 3. Four Sectors of Folklore 4. Functions 5. Course and Forms of Folklore 6. Major Theories and Methods.

COURSE 2 : FOLKLORE AND RELATED DISCIPLINE

Objective : The course will familiarise the students with the relationship Folklore shares with related disciplines.

Contents : 1. Folklore and Literature 2. Folklore and Anthropology 3. Folklore and Psychology 4. Folklore and History 5. Folklore and Archeology 6. Folklore and Linguistics.

COURSE 3 : FOLKLORE OF NORTH-EAST INDIA

Objective : This course will familiarise the students with Folklore materials of North-East India and studies made.

Contents : 1. Status of Folklore studies in North-East India.
2. Collected Folklore materials
3. Folk Literature 4. Folk Art
5. Folk Festivals and Rituals.

COURSE 4 : FIELD TECHNIQUE

Objective : This course will familiarise the students with the general techniques of field methods.

Contents : 1. Collection 2. Classification 3. Processing 4. Indexing 5. Reporting
6. Application of Modern Technology in the collection, documentation and archiving of Folklore data.

contd.../-....

SECOND SEMESTER

DIPLOMA COURSE PART II

COURSE 5 : FOLKLORE THEORIES AND METHODS

Objective : This paper will lead the students to the understanding of major theories and methods.

Contents : 1. Historical - Geographical Method or Comparative Method 2. Functional Theory 3. Psycho-analytical theory 4. Structural analysis- Proppian Model and Levi-Straussian Model 5. Performance-Semiotic Theory.

COURSE 6 : FOLKLORE OF NORTH-EAST INDIA - II WITH SPECIAL REFERENCE TO MEGHALAYA? MIZORAM AND NAGALAND.

Objective : This course will familiarise the students with the Folklore material of Meghalaya, Mizoram and Nagaland.

Contents : 1. Folklore and Folklife 2. Collected Genres 3. Literary Types 4. Other Types 5. Studies made.

COURSE - 7 : INTRODUCTION TO INDIAN FOLKLORE

Objective : This course will familiarise the students with the special characteristics of Indian Folklore and Oral tradition.

Contents : 1. Growth and Development of Folklore Studies in India 2. Special Generic qualities of Indian Folklore materials 3. Folk Epic Folk tales and Oral poetry 4. Folk art 5. Folk performing Arts.

COURSE - 8 : FOLK PERFORMING AND VISUAL ARTS OF NORTH-EAST INDIA.

Objective : This course will lead the students to the understanding of the specific performing arts and folk arts and crafts of the region.

Contents : 1. Selected performing arts of the states of the region-important dances and dramas. 2. Selected arts and crafts of all the states 3. bamboo drafts 4. wood-carving 5. weaving 6. terracotta etc.

N.B. FULL MARKS FOR EACH PAPER - 100 TOTAL - 800

R E A D I N G S

COURSE 1 : Introduction to Folkloristics

Select Readings

1. K.Clarke & M. Clarke — Introducing Folklore, 1970
2. M.S.Edmonson — Lore : An Introduction to the Science of Folklore, 1976
3. David Laubach — Introduction to Folklore, 1980
4. J.Handoo — Folklore : An Introduction, 1989
5. Maria Leach — Standard Dictionary of Folklore, Mythology and Legend, 1949

Additional Readings

6. A.Krappe — The Science of Folklore, 1970
7. Richard M.Dorson — Folklore and Folklife : An Introduction, 1980

COURSE 2 : Folklore and Related Disciplines

Select Readings

1. V.Propp — Theory and History of Folklore, 1984
2. M.J.Herskovitsz — Cultural Anthropology, 1955
3. M.Islam — Folklore : The Pulse of the people, 1980
4. Alan Dundes — The Study of Folklore, 1965
5. Alan Dundes — Varia Folklorica, 1978

Additional Readings

6. Alan Dundes — Interpreting Folklore, 1980
7. Alan Dundes (Ed) — Sacred Narrative, 1982
8. Joseph Champbell — Masks of God, 1969
9. Lauri Honko (Ed) — Tradition and Cultural Identity, 1988
10. Degh, Glassei and Diras — Folklore Today, 1989

COURSE 3 : Folklore of North-East India

Select Readings

1. P.Goswami — Essays in Folklore and Culture of N.E. India, 1987
2. Soumen Sen (Ed) — Folklore in N.E.India, 1985
3. S.N.Barkataki — Tribal Folktales of Assam, 1965
4. P.Goswami — Ballads and Tales of Assam, 1960
5. V.Elwin — Myths of N.E. Frontier of India, 1958

Contd..../.....

Additional Readings

6. M.Brahma — Folk Songs of the Bodos, 1960
7. T.K.Niyogi — Folktales and Myths of Kuki and Tripuri Communities, 1975
8. B.Datta (Ed) — A Handbook of Folklore Material of N.E.India, 1991
9. H.Kamkhenthang — Marem Folktales, 1985
10. H.Kamkhenthang — Folktales of Moyon-Monsang, 1982
11. P.Goswami — Songs and Tales of North East India, 1976
12. B.Datta — Bibliography of Folklore Materials of Assam and Adjoining Areas, 1978
13. Folklore Sections of the Monographs on the major tribes of N.E.India.

COURSE 4 : Field Technique

Select Readings

1. Richard M.Dorson (Ed) — Folklore and Folklife : An Introduction, 1980
2. K.S.Goldstein — A Guide for Field Workers in Folklore, 1964
3. K.Clarke & M.Clarke — Folklore Reader, 1969
4. W.E.Richard — Studies in Folklore, 1971
5. B.Jackson — Field Work, 1987

Additional Readings

6. P.Bartis — Folklife and Field Work, 1979
7. P.V.Young — Scientific Social Surveys and Research

COURSE 5 : Folklore Theories and Methods

Select Readings

1. Richard M.Dorson — Folklore : Selected Essays 1972
2. Richard M.Dorson (Ed) — Folklore and Folklife : An Introduction, 1980
3. Alan Dundes (Ed) — The Study of Folklore, 1965
4. Alan Dundes — Essays in Folkloristics, 1978
5. Alan Dundes — Interpreting Folklore, 1980

Additional Readings

6. Alan Dundes — Analytic Essays in Folklore, 1975
7. William R.Bascom — Contributions to Folkloristics, 1981

con.....

8. Dan Ben - Amos — Folklore in Context, 1982
9. J.Handoo — Folklore : An Introduction, 1989
10. J.Handoo — Currents Trends in Folkloristics 1978
11. V.Propp — Theory and History of Folklore, 1984
12. V.Propp — Morphology of Folktale, 1958
13. Levi-Strauss — Structural Anthropology, 1969
14. Stith Thompson — Motif Index (6 Volumes), 1959
15. Degh, Glassei & Linas — Folklore Today, 1991

COURSE 6 : Folklore of North-East India -II with special Reference to Meghalaya, Mizoram and Nagaland

Select Readings

1. I.M.Simon — Khasi Tales and Beliefs, 1966
2. Mrs. Rafy — Khasi Folktales, 1920
3. R.Luikham — Folktales of Nagaland
4. D.S.Rongmuthu — The Epic Lore of the Garos, 1967
5. D.S.Rongmuthu — Garo Folktales, 1967

Additional Readings

6. H.Bareh — Khasi Fables and Folktales, 1971
7. H.Bareh — A Short Hostiry of Khasi Literature, 1962
8. H.Bareh — History and Culture of Khasi people, 1967
9. N.Shadap Sen — The Origin and Early History of Khasi-Synteng people, 1981
10. Soumen Sen — Social and State Formation in Khasi-Jaintia Hills : A Study of Folklore, 1985
11. M.S.Sangma — History of Garo Literature, 1989
12. J.P.Mills — Folk Stories of Lhota Nagas
13. S.Arokianathan — Thangkul Folk Literature, 1975
14. Folklore Sections of the Monographs on the Khasis, the Garos, the Lushai- Kukis, Ao, Lhota, Sema, Rengma, Angami Konyak Nagas.

contd...../.....

COURSE 7 : Introduction to Indian Folklore

Select Readings

*.	M.Islam	History of Folklore Collections in India, and Bangladesh/Pakistan, 1982
2.	Alan Dundes (Ed)	Varia Folklorica (V.P.Vidyarthi's Chapter on Indian Folklore), 1978
3.	J.Handoo	Folklore : An Introduction (Relevant Chapter), 198?
4.	Blackburn and Ramanujan	Another Harmony, 1986
5.	Claus, Handoo and Pattanayak	Indian Folklore I & II, 1987

Additional Readings

6.	Beck, Claus, Goswami and Handoo	Folktales of India, 1987
7.	Peter Claus and Frank Korom	Folkloristics and Indian Folklore, 1988
8.	Hemango Biswas(Ed)	Folk Music and Folklore, 1967
9.	Kapila Vatsyayan	Traditional Indian Theatre : Multiple Streams , 1980
10.	Kapila Vatsyayan	A Study of Some Tradition of Performing Arts in Eastern India, 1981
11.	M.Miri (Ed) (Soumen Sen's)	Arts and its Appreciation, 1989 Chapter on Folk Art and Craft
12.	Balwant Gargi	Indian Folk Theatre, 1975
13.	Enakshi Bhabnani	Folk and Tribal Designs of India, 1976
14.	Appadorai, Korom and Mills	Gender, Genre, and power in South Asian Expressive Traditions, 1991

COURSE - 8 : Folk Performing and Visual Arts of N.E.India

Select Readings

1.	Kapila Vatsyayan	A Study of Traditions of Performing Arts of Eastern India, 1981

Contd..../.....

2. B.Datta (Ed) — Traditional Performing Arts of N.E. India, 1990.
3. Hamlet Bareh — Art History of Meghalaya, 1991
4. J.N.Choudhury — The Khasi Canvas, 1978 (Relevant Chapter)
5. Aditi Shirali — Textile and Bamboo Crafts of the North-Eastern Region, 1983

Additional Readings

6. A.Ao — Arts and Crafts of Nagaland, 1968
7. Verrier Elwin — The Art of North-East Frontier of India
8. Datta and Duara (Ed) — Handicrafts of Arunachal Pradesh
9. Chapters on Art and Craft of the Monographs on the Tribes of N.E.India.

(ii) Introduction of a Five Year Integrated Course in Social Work-

The meeting of the Board of Post-Graduate Studies in Social Work in its 1st meeting held on 11th and 12th May,1992 considered the proposal for introduction of a Five Year Integrated Course in Social Work. The proposal as approved by the Board of Post-Graduate Studies is placed at Annexure-'A' for consideration of the Council. The proposal was also considered by the School Board of Social Sciences in its meeting held on 14th May,1992, but the Board felt that since the proposal is for a Five years Integrated Course, the matter does not lie within the purview of the School Board. Ths School Board therefore, desided to refer the matter to the Academic Council for decision.

The matter is placed before the Council for consideration.

ANNEXURE-'A'

Rationale of Integrated Social Work Education in the North-East Region.

Integrated Social Work Education.

The Integrated Social Work Education Model envisages a five-year programme. The entry point will be at the successful completion of 10 + 2 level. Preference will be given to the candidates sponsored by government, non-government or voluntary agencies. Under this programme, every year shall be a terminal year. At the end of every one year i.e., two semesters, the successful candidate will acquire a formal qualification.

Given below is the model of the five year programme.

I year	1st Semester 2nd Semester	Award	Certificate in Social Work.
II year	3rd Semester 4th Semester	Award	Diploma in Social Work
III year	5th Semester 6th Semester	Award	Bachelor of Social Work(Honours).
IV year	7th Semester 8th Semester	Award	Post Graduate Diploma in Social Work.
V year	9th Semester 10th Semester	Award	Master of Social Work

A. Rationale for Teaching of the Integrated Programme in the Department of Social Work.

In the Integrated Social Work Education Programme of five years (10 Semesters), teaching for the entire five year period will be carried out in the University Department itself. This signifies that the Department will be concerned not only with imparting instruction in the VII, VIII, IX, X Semesters but also with instruction in the first six Semesters.

Contd/.../-

This further implies that the under-graduate instruction in Social Work will not take place in the affiliated colleges. Hence the Department of Social Work at the Mizoram Campus will have to be suitably equipped with the necessary infrastructure and faculty to cope with the requirements of the programme.

The fore-going constitutes the principals justification for locating the first six semesters of social work education which, in effect is the under-graduate component of the conventional graduation degree in the University Department. It is scarcely possible to equip colleges with uniformity in evaluation, infrastructure and faculty to service the heavy field work practicum component which characterises a typical social work education programme.(Field work constitutes between 35% to 50% of the total curriculum of a social work programme). Moreover, the uniformity of evaluation of fieldwork practicum and necessary level of rigour thereto can be maintained only when instruction is imparted under a single roof. Agencies for fieldwork placements must be selected with utmost care and an adequate mechanism for the briefing of the personnel of these agencies must be evolved so as to ensure necessary level of training and uniformity of the evaluation criteria. Such exercises can scarcely be arranged with any modicum of adequacy if the instruction remains scattered in a large number of diversely equipped colleges.

B. Ra-tionale for the Integrated Programme:

An integrated programme will ensure continuity in learning over five years period. As every year will be a terminal year, it will facilitate release of sponsored students from their respective employers. Since a candidate will become eligible for the award of a formal qualification at the end of each year, this will assist in ensuring enrolment of qualified candidates and create necessary incentives for such enrolment. Thus, a candidate who may wish to discontinue after the first year or second year will have employment opportunities at the grassroots level. Those who proceed into the third year will, upon successful completion of their courses, become eligible for the award of a BSW(honours degree) and will find employment at the intermediate levels . Other candidates, who may like to enroll themselves for fourth

Contd/.../-

and fifth years, will likewise emerge with correspondingly higher qualifications and more advanced training. They will be available for employment at the highest levels including teaching in the Universities.

More specifically the following educational objectives will inform and guide the new programme.

1. Professional Socialization.
2. Peer(student) learning and interaction.
3. Faculty interaction.
4. Matching of senior/junior students in field placements and seniors helping juniors.
5. Unified approach to field work agencies.

Thus,this is a five year integrated programme in which each year is a terminal year. It will be carried out under a single unit and will generate qualified social workers for agencies at the grassroots levels as well as those at the intermediate and higher levels.

In this connection, it needs to be specifically emphasized that, in the N.E. Region,grassroots level workers are particularly in demand. There fore, the system of social work education should be geared to achieving this need. This, thus,underlines the need for a strong first four semester component in the five year programme.

The integrated social work education also derives support from the Report of the 'Curriculum of Social Work Education' prepared by the U.G.C's Curriculum Development Centre at the Tata Institute of Social Sciences. It has advocated an integrated social work education system. Secondly,an exploratory study to determine training needs of social welfare/development personnel in the N.E.Region has put stress on integrated system. This study was sponsored by North Eastern Council and was conducted by the Tata Institute of Social Sciences. Thirdly, College of Social Work(affiliated to the Bombay University),which is a pernior institution in social work education has successfully implemented integrated social work education since 1972.

The Department of Social Work, NEHU,organised skill laboratories and workshops to frame social work education curriculum. The workshops have emphatically recommended the integrated social work Education model.

Preamble and Goals of Social Work Education in the North-East Region.

PREAMBLE

1. Socio-economic, cultural and ecological characteristics of the North-Eastern region pose a challange to professional social work. Community networks, village councils, analogous village level institutions and district councils in the region are dominant and active in providing various types of services to the people having a long history and a rich tradition.

2. Since local groups and communities are exposed to diverse influences, both exogenous and endogenous, the education for professional social work is being visualised as a system of support to an enhancement of the rich indigenous tradition of social service as well as change in the existing social system to make the community system more effective in meeting needs of the people.

3. A five year programme of integrated education in professional social work is, therefore, designed as an attempt to meet the needs of the region, and training of professional and other social workers to participate in social development and transformation of the social and economic conditions of the people in the region.

GOALS

1. To impart education and training in professional social work for providing qualified personnel in social development, social welfare and allied fields.

2. To develop knowledge, skills and inculcate and enhance values and attitude in participants which are conductive to delivery of appropriate services.

3. To develop linkages between theory-practice and action in social development and welfare which is adequately informed by social policy and societal concerns.

4. To obtain interdisciplinary collaboration for the better understanding of human problems, services and issues of social, cultural and ecological development for Social Work practice.

Contd/.../-

5. To document indigenous and prevailing systems of social services among the diverse peoples in the historical and ecological context of North-Eastern Region and to identify the pedagonical, action research and action inputs so as to reinforce the capacity of the concerned peoples to meet the current and the emerging needs and challanges.

6. To identify gaps and needs for initiating new programmes, services and activities in community, voluntary and state sectors.

ANNEXURE - III

Major Requirements of the Programme

Social work education, being a professional training, is unique in many ways, and also distinct from other academic disciplines. It is one of the helping professions like that of medicines and nursing. Therefore, social work education, in terms of fits structure, function and the demands on teaching and non-teaching faculty, should be viewed from such perspectives.

1. Board of Studies :

Integrated Social work Education ecompasses both under-Graduate and Post-Graduate teahhing. There is a link from year to year in theory courses as well as field work practicum. Therefore, there will be one Board of Studies in Social Work for the purpose of finalization and approval of various academic matters. In case of the Department of Social Work one Board of Studies will be constituted to cater to the programme of five year Integrated Social Work Education rather than separate Board if studies for under-graduate and post-graduate training To illustrate , Department of Social Work, Viswa-Bharati, West Bengal has a common Board of Studies in Social Work for its under-graduate and Post-Graduate programme in the Department.

II. Commencement of Teaching.

Teaching will commence only when staff are in position at least two months in advance and after the preparatory work is completed in the Department.

The First semester of the Ist year and the seventh semester of the IV th year will commence simultanesously.

III. Curriculum Structure.

The Department will follow the structure of the marks system adopted by NEHU.

A. The Bachelor Programme will have distribution of marks as under :

a. Scheme of marks

Total Marks - 1600
Theory - 1200
Field Work Practicum-400

contd..../....

b. Semester-wise distribution of marks :

1. Theory will carry 200 marks in each semester. Each paper will carry 50 marks.
2. Field work practicum in the I and II semesters will carry 50 marks each. In the rest of the four semesters each semester will be assigned 75 marks.
3. Therefore, I and II semesters will carry 250 marks in all and the rest of the four semester will carry 275 marks in all.

B. The Masters' Programme will have distribution of marks as under :

a. Scheme of marks :

Total marks	- 1600
Theory	- 1000
Field work practicum	- 550
Viva voce	- 50

b. Semester-wise distribution of marks :

1. Theory will carry 250 marks in each semester. Each paper will carry 50 marks.
2. Field work practicum in the VII semester will carry 100 marks wheras in the rest of the three semesters, it will carry 150 marks.
3. Therefore, VII semesters will carry 350 marks and VIII, IX and X semesters will carry 400 marks each.

IV. Field Work Practicum :

A. Block Field Work :

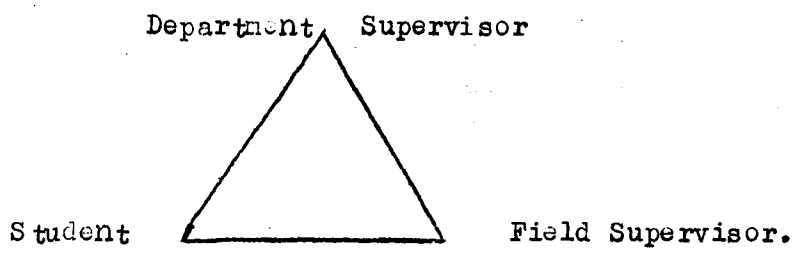
Field Work practicum is a direct service (learning by doing). Knowledge, attitude and behaviour are the three components that are influenced rather then engendering only congnitive change. While the assignments of the students in different semesters may be carried out in the same agencies or communities, their nature will have differential character. Heavier demands will be made on the students as they progress from one semester to another.

In view of the local conditions the field work practicum will be in form of Block Field Work.

1. Field work practicum will be concentrated work for a block period towards the end of each semester.
2. A student will pereferably return to his or her own state for field work practicum and the decision of the Department will be final.

contd...../.....

3. The student will be required to put in 150 hours of field work.
4. A sponsored student will not be placed in his/her own sponsoring agency for field work.
5. The faculty will move to the field work placement locations for supervision and guidance.
6. Field staff will be coopted as field supervisors for the field work practice period.
7. Field work evaluation will be undertaken at three levels.



Note : Department supervisor will have the final responsibility of over all assessment and evaluation.

B. Block Placement:

Bloak Placement will be an integral part of the programme.

Purpose : Social Work student is in need of broadening his/her perspective of welfare services and social problems. An experience of work out side North East Region will additionally widen his/her horizons about the national situations.

Timing : After the satisfactory completion of block field work at the end of second year (IV semester) and at the end of fourth year (VIII semester) and after the University Examination, every student will be sent for Block Placement for a period of eight weeks. The nature of work approved by the Department will be full time in an agency or project preferably outside North East region. The Department will select agencies keeping in mind the learning opportunities for the student.

Award : A student is not eligible for the award of the degree before the completion of block placement to the satisfaction of the Department of Social Work, NEHU.

contd. ../...

V. Admission :-

1. A candidates should not exceed 45 years of age at the time of admission.
2. A candidate who has successfully comple d 10 + 2 level with 35% of marks can apply for admission in the first semester of the first year.
3. There will be no direct admission to second year (3rd semester) and third year (5th semester). Those who successfully complete first year and second year can seek admission to second and third year respectively.
4. A graduate with an over-all average of 45 % of the marks or its equivalent from a recognized University can apply for admission to the seventh semester of the IV year.

VI. Intakes :

1. The number of students to be admitted to the first semester of the first year will be 25.
2. The number of students to be admitted to the seventh semester of the IV year will be 15.
3. Preference will be given to sponsored/deputed candidate of governmental and non-governmental agencies.
4. No admissions will take place after teaching has commenced.
5. Since it is a professional course no quota on the basis of sports of cultural activities will be reserved.

VII. Failure/Discontinuation/Rejoining.

1. A student who discontinues studies at the end of any year will be permitted to rejoin the programme within the period of three years.
2. In case of failure, the student will be permitted two attempts within a period of 3 years.

VIII. Assessment :

Theory Courses.

1. Theory courses will be avalvated on the basis of 25% for internal assessment and 75% for external assessment.
2. No reevaluation of the courses will be permitted.

cont ..../...-

Field Work Practicum.

1. Evaluation of field work practicum will be only by internal assessment.
2. Those who fail in field work practicum will be considered failed for the semester.

IX. Faculty Requirements :

The composition of teaching faculty will be as follows :

Category	No	Experience and Areas of competance.
1. Professor in Social work.	2	Methods of social work, social work Research, social policy and planning etc.
2. Reader in Social work.	4	Tribal welfare and Development community Development,'Policy and planning Social Work Research', Methods of Social Work etc.
3. Lecturer in Social Work.	6	Community Health, Nutrition, Rural and Tribal Development, Non-formal Education, social Defence etc.
4. Social Workers (in-charge of extension/ centres/fields Action Projects)	3	Post-graduate in social work with a minumum of two years practice experience in relation to drug abuse and community interventions.
5. Visiting Professor	1	To help establish and develop the Department for the period of first five years.

6. Guest teachers for the following subjects:

Statistics, English, Office Administration/Public Administration Law Economics, Political Science, Forestry and Allied subjects, Psychology, Medicine, Sociology, Social Anthropology and others.

NOTE:
1. At all levels i,e, category 1-5, two years or more of foeld work experience is required.
2. Every teacher will be required to participats actively in the field work practicum through the supervision and guidance of students in the field.

X. Board of School of Social Work:

For the proper development of Integrated Social Work Education Programme in the North-East region, the Department should have a seperate school of Social work after the review of its work by an expert committee at the end of five years. For an example Department of Social Work, Delhi University has a seperate school of Social Work.

Course Structure.

A. Theory Courses

The structure of Theory Courses is approved by the Board of Studies. However, the content of the courses is in the draft form. It will require another look by the Board of Studies before finalisation.

The structure of theory courses of five years Integrated Programme is given in the Chart (see page 12.)

B. Field Work Practicum.

Field work agencies in the States of North-Eastern States are yet to be identified. Trained Social Workers who will be coopted as Field Supervisors have also to be identified Field work Manual and Field Work evaluation criteria are yet to be prepared. Preparation in the matter of Field Work practicum can be begin only after the basic structure is approved by N.E.H.U.

C. Research and Extension.

This will be developed in due course of time.

COURSE STRUCTURE OF FIRST THREE YEARS

FIRST YEAR				SECOND YEAR				THIRD YEAR			
Semester-I		Semester-II		Semester-III		Semester-IV		Semester-V		Semester-VI	
Course No.	Course Title	Course No.	Course Title	Course No.	Course Title	Course No.	Course Title	Course No.	Course Title	Course No.	Course Title
1.1	Society	2.2	Early childhood Development and Pre-School Education	3.1	Human Growth and Behaviour	4.1	Elective Course: Work with Disabled Non-formal Education; Recreation	5.1	Political Economy	6.1	The family
1.2	Social Work Practice	2.2	Health Information and Nutrition	3.2	Communication	4.2	Work with Groups	5.2	Socio-economic Progs.for special Groups	6.2	Seminar Course: Children Youth; Women; Aged
1.3	Poverty and Development	2.3	Social Welfare Administration	3.3	Social Problems and Social Services	4.3	Work with Communities	5.3	Work with Individuals	6.3	Supervision and Staff Development
1.4	Foundation Course-I	2.4	Functional English and Communication-I	3.4	Functional English and Communication-II	4.4	Foundation Course -II	5.4	Appropriate Technology for Development.	6.4	Socil Work Research.
1.5	Filed Work Practicum	2.5	Field Work Practicum	3.5	Field work Practicum	4.5	Field Work Practicum	5.5	Field Work Practicum	6.5	Field Work Practicum.

NOTE: Field Work will duly incorporate visits; observations, politics, indentification of cases and assistance to the needy.

NOTE; Field Work will incorporate study tours; participation in direct services in the agency/Community.

NOTE: Field Work will incorporate Problems programme, multi-service based field work with a focus on both service delivery and change process, Documentation of field experience will be systematically done.

Course Structure of Masters' Programme

Fourth Year				Fifth Year			
Semester-VII		Semester-VIII		Semester-IX		Semester-X	
7.1	Psychology for Social Workers OR Man and Society	8.1	Political Economy OR Social Anthropology	9.1	Work With Groups-II	10.1	Social Policy and Social Development
7.2	Advance Course on Poverty and Development.	8.2	Ecology and Social Work	9.2	Work With Coommunities-II	10.2	Field Instruction and Supervision.
7.3	Integrated Social Work	8.3	Work with Groups-I	9.3	Development Communication	10.3	History and Philosophy of Social Work.
7.4	Work with Communities-I	8.4	Social Work Research	9.4	Social Administration and Management of Organisations.	10.4	Seminar Course:Social Work in:Health;Educational Organised & Unorganised Sector;Institutions; Migrant population; substance Abuse & HIV/ AIDS
7.5	Work with Individuals-I	8.5	Work with Individuals-II	9.5	Social Problems and Social Services	10.5	Women and Development
7.6	Field Work Practicum	8.6	Field Work Practicum	9.6	Field Work Practicum	10.6	Field Work Practicum

(iii) Proposal of the Centre for Eco-Development for a Certificate Course in Eco-Development.

The proposal for the Certificate course in Eco-Development was considered and approved by Centre's Steering Committee in its meeting held on 3.6.91 and by the Advisory Committee in its meeting held on 19.6.91.

The proposal was thereafter considered by the School Board of Life Sciences in its meeting held on 10.6.92 and the Board approved the proposal with suggestions for certain modifications.

The Head of the Centre has accordingly modified the proposal and the same is placed at Annexure-A for consideration of the Council.

5.6:3 (2)

CENTRE FOR ECO-DEVELOPMENT, SCHOOL OF LIFE SCIENCES
NORTH-EASTERN HILL UNIVERSITY
SHILLONG- 793 014

Certificate Course in Eco-development

Preamble

The north-eastern region of India is predominantly hilly region. Though endowed with vast natural resources, the hilly and mountaineous topography makes the ecosystem very sensitive to disturbances, and often otherwise minor perturbations cause irreversible damage to the natural systems of the region. To contain the damage of this fragile ecosystem one of the fundamental requisite is the trained manpower who can take up the problem with proper understanding and thus help in solving them. Further, in this region, there is scarcity of trained manpower in the areas of ecology and environment.

Keeping above in view, a one semester Certificate Course in Eco-development is proposed. The course will acquaint the students with various ecological principles, environmental problems related to developmental activities; their couses, consequences and remedial measures. A major section of the course will deal with the conservation aspect of the development project. The inherent dangers in various developmental activities will be highlighted taking various case histories from India and world-wide. The socio-economic, cultural and health aspects will be emphasised. The students will also be trained on the methods to evaluate the environmental impact of various developmental activities and to predict their consequences. It is envisaged that the students trained in this area will help in reducing conflict between development and conservation, as the basic theme of the course will be to develop a discipline where it is understood that economic development and conservation are participants of the same process.

In the university system of whole country, ours is the only Centre of its kind and to our understanding the proposed course will be the first on the subject of Eco-development. Therefore, the manpower trained in this subject may take up problems of national or regional interests in other parts of the country as well. The trained manpower will have openings in the central and state departments of environment, pollution control boards, industries, environmental consultancies and educational and research organisations.

The course will help reorient the outlook, perception and attitude of students personnels serving in government departments towards environmental impacts of developmental activities.

It is expected that the certificate course will better equip the personnel in predicting the ecological backlashes of developmental projects and thus preventive measures could be introduced in the initial stages of project implementation.

The course has been developped by seeking comments from a number of experts in the field and it has been approved by the steering and Advisory Committees of the Centre. The Centre has also conducted a survey for the comments and views of user agencies. Most user agencies have appreciated the proposal.

The resource persons required for running of the course will be drawn from the faculty of the Centre, related departments of the University and local research organisations. The expenses involved in running of the course can be mant from the existing funds of the Centre and if necessary sponsorship may be sought from the empalyers of the in-service candidates.

In the Departments of Botany and Zoology, the subject of ecology is taught as core course with bias towards plant and animal ecology. The course proposed here deals with the applied aspects of ecology with bias toward conservation of environment and other socio-economic aspects related with the human environment. Thus it is in accordance with the functions of the Centres (Section 26 (1) (K) of the NEHU Act 1973) as outlined in the North-Eastern Hill University Ordinances and Regulations Series OA-11. Due emphasis is given to the environmental issues related to the North-Eastern Region. The course is meant for imparting training to the in-service people mainly working in the departments of agriculture, industries, forests, pollution control board etc. However, if sufficient number of in-service students are not available, the seats will be filled by the general students.

Intake of Students :-

It is proposed that a maximum of 10 students will be admitted each year.

Eligibility criteria for admission :-

Candidates should be a graduate from North-Eastern Hill University or from any other recognised university. In service candidates should possess a minimum of two years work experience in governmental/semi-governmental or private organisation.

Teaching Period :- One semester.

Examination and evaluations :-

Theory will be of 200 marks and Project work 100 marks distributed into 2 theory and one project work (Total papers-3). For the evaluation procedures, general guide-lines of the University examinations will be followed.

Degree/Diploma/Certificate

On successful complation of the Course the students will be awarded a Certificate in Eco-development.

CENTRE FOR ECO-DEVELOPMENT
SCHOOL OF LIFE SCIENCES
NORTH-EASTERN HILL UNIVERSITY
SHILLONG

SYLLABUS OF THE CERTIFICATE COURSE IN ECO-DEVELOPMENT

PAPER - I MARKS - 100

ECO-DEVELOPMENT, ECOLOGY AND ENVIRONMENTAL ISSUES

Unit 1. Principles and concepts in ecology regarding structure and function of an eco-system: bioenergetics, nutrient cycling and evolution of an ecosystem taking forest ecosystem as an example.

Unit 2. Definition and scope of eco-development, conventional development vis-a-vis eco-development, need for eco-development with special emphasis on forestry, agriculture, soil conservation and industrial growth. Eco-sociology and peoples involvement in eco-development.

Unit 3. Impact of agriculture on growth of population, depletion of forest, necessity of industrialization, impact of industries on natural resources and pollution, problems of soil erosion and land degradation, environmental problems of India and north-east.

Unit 4. Environmental carrying capacity. Industrial, agricultural and urban development and its impact on local, regional and global ecosystem. Remote sensing, ecological modelling and techniques for data processing, storage and analysis.

Suggested Readings

1. Odum, E.P. 1975. Fundamentals of Ecology. W.B. Saunders Company, Philadelphia.
2. Kormondy, E.J. 1978. Concepts of Ecology. Prentice Hall of India, New Delhi.
3. Smith, R.L. 1976. Elements of Ecology. Harper and Row Publishers, New York.
4. Remmert, H. 1980. Ecology a Textbook. Springer Verlag, Berlin.
5. Whittaker, R.H. 1975. Communities and Ecosystems, MeMillan, India, New Delhi.
6. Franke, R.G. and Franke, D.N. 1975. Man and theChanging Environment. Holt. Renechart and Winston, New York.

7. Ehrlich, P.R. and Ehrlich, A.H. 1972. Population, Resources Environment : Issues in Human Ecology. W.H. Freemen and Co., San Francisco.
8. Gerasimov, I.P. et al. 1975. Man Society and the Environment Progress Publishers, Moscow.
9. Smith, R.L. 1976. The Ecology of Man : An Ecosystem Approach. Harper and Row Publishers, New York.
10. Ehrlich P.R. & Ehrlich, A.A. & Holdren, S.P. (1970). Eco-Science Population, Resources and Environment, W.B. Freemen and Co., San Francisco.
11. P. Meodows et al. (1974). Limits to Growth, Club of Rome Report, MIT, Hass.
12. Robinson, H. 1982. Bio-Geography, FLRS, McDonald & Evans, London.
13. Joy, T. 1977. Bio-Geography; A Study of Plant in the Ecosphere, Oliver & Boyl, Edin,
14. Dallmeier F. 1992. Long-term monitoring of biological diversity in tropical forest areas. MAB-Digest, UNESCO, Paris.

Journals

1. Environmental Conservation
2. World Development
3. People

PAPER - II MARKS - 100

ENVIRONMENTAL ECONOMICS, ENVIRONMENTAL IMPACT ASSESSMENT AND NATURE CONSERVATION

Unit 1. Concept of environmental economics, environmental accounting (cost-benefit) and eco-budgeting in terms of energy, pattern of energy use, cost and pricing of common goods: air and water.

Unit 2. Basic principles and methods of environmental impact assessment of developmental projects. Project evaluation methods.

Unit 3. Principles of conservation, renewable and non-renewable resources, waste recycling, treatment and disposal, conservation strategies for land, water and forest resources. Conservation movements in India and abroad (national) parks, wildlife sanctuaries, biosphere reserves).

Unit 4. Methods and strategies for management and development of degraded ecosystems. Concepts and principles of optimisation and sustainable development.

Suggested Readings

1. Seneca, J.J and Taussige, M.K- 1974. Environmental Economics. Prentice Hall, Inc. Englewwod Cliffs, New Jersey .
2. Desmann, R.R.; Miltan, J.P. and Freeman, R.H. 1979. Ecological principles for Economic Development, John Wiley & Sons Ltd., New York.
3. Barney, G.O. 1980. The Global 2000 Report to the President of the United States. Entering the 21st Century. Vol.I The Technical Report. Pergamon Press. New York.
4. Streeten, P and Jolly, R.(Eds.) 1981. Record Issues in World Development: A Collection of Survey Articles. Pergamon Press, Oxford.
5. Meadows, P. et al. (1974). The Limits to Growth. The Club of Rome Report, MIT, Mass.
6. Centre for Science and Environment (1984). The State of India's Environment: A People's Report New Delhi.
7. Ramade, F. 1984. Ecology of Natural Resources. John Wiley & Sons
8. Munn R.E. 1979. Environmental Impact Assessment, SCOPE-IUNC, John Wiley and Sons. New York.
9. Southwick Charles H. 1976. Ecology and Quality of our Environment. D.Van Nostrand Company, New York.
10. Simmons, I.G. 1981. The Ecology of Natural Resources, The English Language Book Society, London.
11. Vandyne, G.M.(Ed) 1969. The Ecosystem concept in Natural Resources Management, Academic Press, London.
12. Yong M, and I.Natrajan 1989. Human investment and resources use: a new research orientation on at the environment/economics interface MAB Digest, UNESCO, Paris.
13. Schreckenberg K. et al 1990. Management and Restoration of Human-impacted resources: approaches to ecosystem rehabilitation MAB Digest, UNESCO, Paris.

PAPER - III Marks- 100

Field demonstration of degraded land and aquatic systems, impact of dam building, deforestation, soil eresion and industrial pollution quantitative estimation of some environmental parameters, field data analysis and preparation of a chart-report; Seminar; Home assignment.

5·6:3(5).

CENTRE FOR ECO-DEVELOPMENT SCHOOL OF LIFE SCIENCES
NORTH-EASTERN HILL UNIVERSITY
SHILLONG- 793 014

Regulation on Certificate Course in Eco-development.

1. There shall be one semester course leading to the award of Certificate in Eco-development.

Admission Requirements.

2. (a). The candidates seeking admission to certificate course programme must be a graduate from North-Eastern Hill University or from any other recognised university. In service candidates should possess a minimum of two years work experience in governmental/semi-governmental or private organisation.

(b) The candidate must fulfil all other conditions as may be laid down by the University/Admission Committee from time to time.

(c) Reservation of seats for candidates belonging to scheduled castes and scheduled tribes shall be as per policy laid down by the University form time to time.

(d) In all cases of admission the decision of the admission committee shall be final.

Examination and scheme of papers.

3. (a) The duration of the Certificate Course Programme shall be one semester.

(b) There shall be an examination at the end of the semester.

(c) The scheme of papers and course contents shall be prescribed from time to time.

4. The attendance requirements, the procedure for admission to examinations, the declaration of results, the gradation and award of the certificate shall be as prescribed by the ordinance.

(iv) Agenda item to the Academic Council on Course Structure of the Three Year Degree Course to be introduced from 1993 Session -

The Academic Council in its 39th meeting constituted a Committee to examine and suggest a common structure for the Three Years Integrated Degree programme. The Committee was again reconstituted in April,1992 with the following directives:

1. Uniformity within the University Pattern
2. It should provide for a major subject and students may be allowed to opt for a general integrated Pass Course or for a Three Year Integrated Course with Major.
3. There should be a University examination at the end of every year .

The Committee had several sittings wherein suggestions from the Principal's Conference and many individuals were discussed thread bare. The Committee also took into account the infrustural facilities available in the affiliated and the constituent colleges. The committee had its final sitting on 30th July,1992 and made the following recommendations with the structural position as shown in Annexure -'A'.

1. It is recommended that the total mark allocation may be as under:-
   (a) Degree without major..... 1400
   (b) Degree with major..... 1800
2. The total marks in Science,Arts and Commerce stream may be uniform.
3. Three papers in each elective may be common with the Major papers i.e. paper I,Paper II and Paper III.which may be spread over thee 1st year, 2nd year and 3rd year respectively.
4. Maximum load may be emphasised in 2nd and 3rd year as more teaching days are available when compared to 1st year and also to allow the students to go to P.G. Classes with fresh memories of subjects.
5. It may not be required of the students to wait for the result to go to the 2nd and 3rd year classes. Students failing in all or some of the subjects may be given the scope to clear them in next following two chances. However, a student to may be required to clear the Degree within 5 years from the date of admission to the Degree Course.

Contd/.../-

6. A student from Arts Group may be permitted to opt only one elective having four hundred marks and such candidate only one M.I.L. paper of 100 marks may be allowed to offer.

7. The M.I.L. paper in 3rd year may be common to both type of candidates having major or no major. This paper may comprise of prose, poetry, drama etc.

8. A student from science stream opting Economics as one of the electives may have 4 papers in Economics, the 4th paper being from the major group not common to general stream.

9. A student may not be permitted to opt for major if it was not offered at P.U. level and if the candidate does not scoer score a minimum of 45% in the subject and an aggregate of 40% at PU level.

Contd/.../-

10) A student choosing English as his Major-elective may be required to opt for one elective in lieu of general English of 200 marks and one MIL of 100 marks.

11) As far as practicable unitisation in setting questions may be avoided but the questions may be arranged in suitable groups. The marks in each paper may be divided as under:-

(a) Question on multiple choice etc..... 20% marks
(b) Short questions to be answered in one or two sentences ..... 20% marks
(c) Descriptive type questions ..... 60% marks.

12) The syllabi on G.F.C. may be updated so as to incorporate 25% marks in G.F.C. to questions on current events.

13) The option may be kept open to a student to change from a major-elective to a general-elective but not vice-versa.

14) The minimum number of lectures essential in a particular topic may be specified in the syllabus.

15) A student who has passed PU(Sc) examination may be allowed to opt for a major elective from Arts group but he may be required to clear the subjects of PU level simultaneously.

16) In order to pass the Degree examination, a candidate may be required to obtain the minimum marks as under:-

(a) 30% marks in each theory paper.
(b) 40% marks in each practical paper
(c) a student securing 33% marks or more but less than 45% marks in aggregate may be declared to have passed as simple pass, students securing 45% marks or more but less than 60% may be placed in 2nd division and students securing 60% marks or more may be placed in 1st division.
(d) A student obtaining 75% marks or more in a particular subject may be awarded distinction in that particular subject but a student may be required to secure a minimum of 85% marks to obtain distinction in G.F.C.

In the process of implementation some more details may be required to be chalked out. However, the AC may consider the above for consideration and approval so as to have the scheme implemented by 1993 session.

5:6:4(5)

DISTRIBUTION OF MARKS AND SYLLABUS PATTERN FOR THE THREE YEARS DEGREE COURSE TO BE INTRODUCED FROM 1993 SESSION

ANNEXURE-'A'

B.A/B.Sc/B.Com. without Major

B.A(General)

Subject	1st year	2rd year	3rd year
English	100	100	-
G.F.C.	-	-	100
M.I.L.	-	100	100
Elective I	100	100	100
Elective II	100	100	100
Elective III	100	100	100
T o t a l	400	500	500
		Grand Total	1400

B.Sc(General)

English	100	-	-
G.F.C.	-	-	100
*Elective I	100	200	100
* Elective II	100	200	100
* Elective III	100	200	100
* 25% will be alloted for practicals			
Total	400	600	400
		Grand Total : 1400	

B.Com(General)

English	100	100	-
G.F.C.	-	-	100
M.I.L.	-	100	100
Elective I	100	100	100
Elective II	100	100	100
Elective III	100	100	100
T o t a l	400	500	500

Grand Total : 1400

B.A/B.Sc/B.Com. with Major

B.A(with Major)

Subject	1st year	2nd year	3rd year
English	100	100	-
G.F.C.	-	-	100
M.I.L.	-	100	-
Elective I	100	100	100
Elective II	100	100	100
Major(Elective)	200	300	300
Total	500	700	600
		Grand Total :	1800

B.Sc(with Major)

English	100	-	-
G.F.C.	-	-	100
M.I.L.	-	-	-
Elective I	100	200	100
Elective II	100	200	100
Major(elective)	200	300	300
Total :	500	700	600
		Grand Total:	1800

B.Com(with Major)

English	100	100	-
G.F.C.	-	-	100
M.I.L.	-	100	-
Elective I	100	100	100
Elective II	100	300	300
Major (Elective)	200	700	600
Total :	500		

Grand Total 1800

5:7 :- Affiliation matters :-

Affiliation of Nongtalang College upto P.U. (Arts) level.

The Inspection Report of Nongtalang College was placed before the Academic Council in its 42nd meeting held on 27th,June 1991 for consideration of granting provisional affiliation to the College. The Council observed that the teaching staff do not fulfil the qualification requirement and desired that Clarification should be sought from the College in this regard.

The case of the college was considered by the Affiliation Committee in its 10th meeting held on 30th,June'1992 wherein the committee felt that though the teachers do not have the qualifications prescribed by the UGC, the State Government has accepted their qualifications as sufficient to teach at P.U. level. The Committee therefore recommended grant of provisional affiliation to Nongtalang College for two years.

The Inspection Report of the College is placed at Annexure - A for perusal and reference of the Council.

While considering the case of the College, the Committee also recommended that a general circular may be issued to the colleges to apprise them that teachers at present enjoying State Government scale and teaching in P.U. level, may not be qualified to teach at Degree level if they do not fulfil the prescribed UGC norms.

The matter is placed before the Council for consideration.

5:7:1:(2)

NORTH-EASTERN HILL UNIVERSITY
S H I L L O N G

ANNEXURE-'A'

FOR NEW COURSE/UPGRADATION

INSPECTION REPORT

1. Name of the College : Nongtalang

2. a) Year of affiliation and corresponding University Notification No._____

   b) Level to which affiliation: P.U/BA/B.Sc/B.Com

   P.U. Arts

3. Affiliation/Permission sought to upgrade to or BA/B.Sc/Pass Course In Introduce (a new subject) English, MIL, Economics

   PU Pol. Science, Khasi

   B.Sc.Hons (2nd Lang) History, Education and in Soc. Anthropology.
   B.Com.in

4. Admission (for the last three years)

Year	P.U	B.SC.I	B.Com.I	B.A.III	B.Sc.III	B.Com.III
1989	30					
1990	35					
1991	45	(Expected)				

5. Result of University examination during the last three years:

Examination	Year	Percentage of Pass
So far consider	Non appeared	as institutional

6. In case the college is seeking Honours in a subject (a) for which it has a lready a Pass Course please give below the No. of students admitted in the last three years and their results for these years in the SUBJECT in which College has applied for Honours.

YEAR	NO. OF STUDENTS APPEARS	% SUCCESS

7. FUNDS

   (a) Whether the College is having a Reserve Fund in long term fixed deposit: Rs.187,000/-of which Rs.100,000/- is fixed deposit, documents from bank enclosed herewith, in Ka Bank Nongkyndong Ri Kha si Jaintia Bank

   If yes, the details thereof: (Bank No. of Term Deposit Receipt, etc.)

   (b) Present working fund : Rs. 87,000/-

Co[illegible]/...

B. Qualification/Specialization of the Teaching Staff (of the relevant subjects only)

	Name and Designation	Qualification(with grade and subject in P.G.	
1.	Shri P.M. Tariang (Principal)	M.A. IInd Class	Anthropology
2.	Sri.S.K.Nath	M.A. IInd Class	Economics
3.	Miss R. War	M.A.IInd Cla ss	Kha si
4.	Sri A.Bhattacharjee	M.A. IInd Class	History
5.	Sri P.Bhuyan	M.A. IInd Class	Education
6.	Sri S.K.Nayek	M.A. IInd Class	English
7.	Sri A.K.Adhikari	M.A. IInd Class	Pol.Science

5-:7:1:(4)

KA BANK NONGKYNDONG RI KHASI JAINTIA
KHASI JAINTIA RURAL BANK
(Sponsored by:STATE BANK OF INDIA)
Head Office:POLICE BAZAR.
SHILLONG-793 001.

Telegram:BANGLEP
Phone :25545

No. Date 21st.June,1990

This is to certify that the Nongtalang College has got a Sum of Rs, 70,000/-(Rupees Seventy thousand only) in Special term (Fixed) deposit ammount for 5(five) years with our branch(KA BANK NONGKYNDONG RI KHASI JAINTIA) NONGTALANG BRANCH.

Sd/-Illegible
Branch Manager
Nongtalang.

5:7:1:(5)

KA BANK NONGKYNDONG RI KHASI JAINTIA
KHASI JAINTIA RURAL BANK
(Sponsored by : STATE BANK OF INDIA)
Head Office : POLICE BAZAR.
SHILLONG- 793 001.
Telegram : BANGREP
Phone :25545

No. Date 11th Dec. 1990.

This is to certify that Nongtalang College has got the deposit of Rs.30,000/-(Rupees thirty thousand only)in fixed deppsit i.e. TDR No. KJT002069 in our Branch Ka Bank Nongkyndong Ri Khasi Jaintia, Nongtalang.

Sd/- Illegible
Branch Manager
Nongtalang

NOTE; THE UNIVERSITY REGULATION STIPULATES THE FOLLOWING STAFFING REQUIREMENT

Level/Class	Minimum No. of Teachers in each subject
a) P.U. Non-Laboratory	One One in each subject
b) P.U. Laboratory	Two at P.U.Level
c) Degree Non-Laboratory(Pass)	Two in all subjects and 3 in English
d) Degree Laboratory(Pass)-	Six of whom four should be Lecturers
e) Degree Non-Laboratory(Pass)	Four in all subjects other than English & other Elective Languages in which there should be at least five.
f) Degree Laboratory(Pass) + Hons. + P.U.Laboratory.	Seven of whom six shall be Lects.

9. LAND AND SITE

a) Whether the college is having permanent building on its own land. Not yet

b) Area of the College Campus 3 hectars. At present the

c) Accommodation 'give size) :- College is run at Nongtalang

1) One room for the Principal High School building

2) One room for the Vice-Principal 10' x 10'

3) One room for the College Office 10' x 10'

4) For Staff common room 14' x 14' 14' x 14' Adequate/Inadequate.

5) Common room for Boys and Girls 14' x 14'

6) Library with reading room 20' x 20'

7) Class room 6 Nos 14' x 20' Adequate

10. Workload of Teachers : 8 hours per week. Since our the P.U. Ist and 2nd yr. classes and held more than 1000 Vol.

11. Library Books :-

Total Volumes

Subject wise break-up(of relavant subjects only): Please see the enclosures.

Contd/.../-

Whether the College has a trained Librarian :

12. Laboratory facilities

a) Whether accommodation is adequate or not :

b) No.of shifts the students do their practicals :

13. When was the last Governing Body meeting :

14. Any other relevant information(s)/point(s)

RECOMMENDATIONS

Please make your recommendation without any ambiguity. In case you suggest provisional affiliation for a particular period, please mention the academic year specifically. Please also mention the conditions, if any, to be fulfilled if extension of affiliation is to be considered.

We recommend that the College expeditiously be affiliated provisionally on the following grounds -(1) It is the 2nd pioneer institution in the District having a large potential for future growth (2) The college has at this time 6 feeder high schools with an expected number of pass out about 200, most of them cannot afford to ha ve higher education elsewhere due to financial constraint, also there are number of other invincible problems being at the farthest end of the country, the students of this area find it difficult to secure admission and face serious problems of getting accommodation elsewhere. However the recommendation of affiliation be granted Provisionally for a period of three years starting from 1991 until the College has its own building. Already some work of construction is being started. Therefore, we recommend strongly for provisional affiliation.

Sd/-Dr. L.S.Gassah, 18/12/90
Singnature of the members of the Inspection Team.

Sd/- K.Bez, 18/12/90
Convener,
Inspection Committee of
Nongtalang College.

5.8 —— OTHERS

(i) Closure of the Institute of Self Organising system & Bio-Physics Report of the Committee.

In its 43rd meeting held on 3/4.3.92, the Academic Council decided to constitute a Committee to work out a detailed profile covering all aspects and desirability for a Department/ Centre to enable the Council to decide on the re-structuring of the Institute of Self Organising system & Bio-Physics.

The Report of the Committee is placed at Annexure-'A' for consideration of the Council.

Report and Recommendations of the Committee constituted by the Vice-Chancellor, NEHU, Shillong to work out the academic profile and change of name of the Institute (ISOS&B):-

The members of the Committee met at 5 p.m on 9.6.92 at the Institute premises, Permanent Campus, NEHU, Shillong. The following members were present:-

1.	Prof.(Dr)K.Chatterjee, Dean, School of Life Sciences, NEHU, Shillong.	Chairman
2.	Prof.(Dr)C.S.Shastry, Dean, School of Physical Sciences, NEHU, Shillong.	Member
3.	Prof.(Dr)A.N.Rai, Department of Biochemistry, NEHU, Shillong.	Member
4.	Prof.(Dr)H.Junjappa, Department of Chemistry, NEHU, Shillong.	Member
5.	Prof.(Dr)K.P.Sinha, Director, ISOS&B, NEHU, Shillong.	Convener

On a query from the Chairman(Prof.K.Chatterjee), Prof. K.P.Sinha (Convener) clarified that he had met the Vice-Chancellor, Prof. B. Pakem on 4th May, 1992 and that all the three alternatives Department/ Centre/Institute were to be considered by the Committee as was the Directive of Professor Yash Pal, Chairman, U.G.C with whom Prof. Iqbal Narain, former Vice-Chancellor had correspondence after receiving the report dated 18.6.1990 of the UGC Committee on the appraisal of ISOS&B.

Preamble

The proposal to start activities in the field of biophysical sciences was mooted in the 20th and 21st Academic Council meetings in 1984. It was resolved in its 26th meeting on May 12-13, 1986 to establish the Institute(ISOS&B). This recommendation was accepted by the Executive Council in its 51st and 53rd meetings and ISOS&B was established for research in self-organising systems and biophysical Sciences. The Institute was assured of its autonomy, interaction with

Contd/.../-

the relevant schools of NEHU, status of the Institute Director to be at least that of a Dean of a School plus suitable capacity to implement the envisaged purposes etc; appropriate funds and positions were sanctioned by the UGC and appointments made. Problems arose in the implementation of the programme, acquiring instruments and building up the Institute by Prof. R.K.Mishra, who was appointed the first Director. He also became the Vice Chancellor of NEHU, which was the source of the problem. The UGC appointed an Expert Committee for the appraisal of the ISOS&B. The report of the Committee was forwarded by Mr. D.P.Hira, Jt. Secretary, UGC (please seen reference (1) to Prof. Iqbal Narain, Vice Chancellor, NEHU. The Commission while accepting the report that the ISOS&B in the present form may be closed by 28th Feb. 1991 invited the comments of the University on the recommendations.

1. Prof. Iqbal Narain (V.C, NEHU) wrote several letters to Prof. Yashpal in his response to the Report and sent the reaction of Dr. R.K.Mishra (2,3,4). The V.C requested the Chairman that the UGC should give another chance to the Institute with adequate funds to rectify the faults (2,4).

The UGC Chairman (Prof. Yashpal) (5,6) suggested that there should be restructuring of the Institute after finding an appropriate leader. He need not be in the same discipline as Prof. R.K.Mishra. The resources would be forthcoming for anything worthwhile undertaken by the group in the Institute. The Institute should develop an personality based on the work of the people who gather and carry out activities in a few areas and build up. The first thing is to find a new person (as Director). Everthing should be done in discussion with him.

2. He agreed with the suggestion that a high power search Committee for the selection of the Director be appointed with Prof. C.N.R.Rao, Chancellor of NEHU, as the Chairman to carry out reorganisation (alternatives to be examined Department/Centre/Institute). Even the name of the Institute and its functions should evolve along with the new Director.

Contd/.../-

5.8.1 (4)
5.8.1 (5)

Taking all these into account the search committee was constituted with Prof. C.N.R.Rao, Chancellor, NEHU and Vice-Chancellor, NEHU and other distinguished scientists as members after the post of Director, ISOS&B was duly advertised(7).

3. The search committee met on 9th Feb.1991(at NPL, New Delhi), took into account the Report and directives of Prof.Yashpal. It decided to offer the post of Director, ISOS&B to Prof.K.P.Sinha on a contract of three years. Prof. C.N.R.Rao telephoned Prof. K.P.Sinha(who was in Banga lore) at 4 p.m(the same day, during the meeting), Prof.K.P. Sinha made it clear that the academic programme will have to be restructured and the name of the Institute will be appropriately changed. Prof. K.P.Sinha visited NEHU, Shillong from 26th to 28th Feb, 1991 for fact finding - where he reiterated his intention of restructuring and changing the name. After discussion with Prof. Iqbal Narain, V.C, NEHU a nd others, he was given the formal letters of appointment as Director of the INSTITUTE (ISOS&B) on contract for three years.

4. He finally joined the INSTITUTE on Ist July, 1991. Prof. I. Narain (V.C) gave him a copy of the Report to offer his comments.

5. Prof.K.P.Sinha called a meeting of the faculty on July 4, 1991. After taking into account the changed situation the name "Institute of Fundamental Research" with current thrust on complex systems was proposed and unanimously endorsed by the entire faculty of ISOS&B. It requested the new Director to communicate this to the Vice Chancellor and formalise the new name through appropriate bodies. A copy of the minutes of the faculty meeting was sent to the Vice Chancellor (8).

6. In a meeting of the Institute Board held on 28th Oct. 1991 at the Institute premises in the Bijni Complex(9), the Board members approved the resolution of the Institute faculty members that the name ISOS&B be changed to the "Institute of Fundamental Research". The current emphasis will be on complex systems (both living and non-living). The thrust areas may change from time to time as the Institute evolves. A copy of the minutes, duly signed by members present was sent to V.C/Registrar.

Contd/.../-

7. Letters were sent by Prof. K.P.Sinha ,Director of the Institute on 6th July,1991 and 21st August,1991 to the Vice Chancellor regarding the above recommendations(10,11).In this,rationale behind the choice "Institute of Fundamental Research" with emphasis on complex systems(both living and non-living) was given.This was also done in keeping with the wishes of Prof. Yashpal(UGC Chairman),Prof. C.N.R.Rao,Chancellor of NEHU,views of the expert committee which gave the Report and with the concurrence of the V.C,NEHU.It was requested that the item be brought as agenda of the Academic Council and the Executive Council meetings.

8. Prof.K.P.Sinha also submitted his comments on the UGC committee report to Prof.I.Narain,V.C,NEHU.The reply contained the suggestion to change the nomenclature of ISOS&B to "Institute of Fundamental Research". This was personally delivered by Prof.I.Narain to UGC authorities. In his subsequent visits to UGC,Prof.K.P.Sinha personally handed over his reply to the comment to the UGC authorities(present Chairman,Prof.Ram Reddy)on 18th Dec.1991 and 21st Feb.1992.It also contained requests for 8th plan allocations and immediate financial needs of the Institute.

Prof.I.Narain left NEHU in September(1991) and there was no meeting of A.C for sometimes.

The item,however, came in a different form (item No.5:8:6(I) in the 43rd meeting of A.C on 3rd and 4th March,1992 - which requested the present V.C, Prof.B.Pakem,to constitute the present committee to work out the details of the academic profile and restructuring.

9. The committee examined the academic qualifications,training and specialisation of the faculty members at the time of joining the ISOS&B and their current interests. It also examined the views of the research scholars of the Institute.This profile of the faculty is given in the Appendix-I. The faculty comprises physicists(theoretical and experimental),biologist,biochemists, immunologist,chemists and quantum chemists.Similarly the 10 research scholars/students are also drawn from various disciplines. The research activities are also open ended, diverse and embrace many disciplines. The areas are further enlarged with the joining of Prof.K.P.Sinha as the Director. The diverse background of the faculty and students thus cannot produce a coherent department dealing with traditional subjects (which involves M.Sc teaching).

Contd/.../-

The committee noted that the centres at NEHU are much more restricted and activities converge to a specific goal. Thus the diverse open ended interdisciplinary research programmes envisaged by the Director and the faculty cannot fructify in a Centre.

10. Thus the committee members are of the view that an Institute within the University system devoted to interdisciplinary research in emerging areas envisaged is the right choice. The Institute, which actually started functioning in 1988, has now added new-dimension with the joining of Prof. K.P.Sinha, Its research performance is commendable and over 600 good papers and one thesis have come out of the activities so far(details of publications are given in Appendix-II).

With the appointment of Prof. K.P.Sinha, as the new Director for 3 years, the restructuring and transformation of the Instituted started from July 1,1991.The complexion of the Institute has changed and the scope enlarged considerably. It is envisaged to pursue researches in areas embracing mathematical,physical,chemical and life sciences. Some of the areas visualized(related to multicomponent complex systems,both living and non-living) are on the cutting edge of science. Thus the "Institute of Fundamental Research" will play an important complementary role and will strengthen the academic profile of the University

11. The committee members support the idea that the present faculty should be organised as a "semi-autonomous institute" within the NEHU The UGC should be requested to ensure regular flow of funds in the form of plan and non-plan grants separately to this Institute.A formal proposal incorporating the budgetary demands should be sent immediately to the UGC.The status of the Director of the Institute should be at least that of the Dean of School. The provision already exists and it should be implemented. The Institute will retail all the Instruments, for use in research work for the Institute in particular and NEHU in general.

12. The Institute should have self-correcting academic,financial and administrative components for proper functioning of the Institute. The Institute will take research scholars/students for research leading to Ph.D/M.Phil degree in science. UGC should be approached to allocate funds (particularly for recurring expenses and immediate needs) for a proper functioning of the current level of faculty and students. In addition, the Institute will also approach various agencies and organisations for more funds through research projects/ schemes etc. It is noted that they have already been sanctioned a few research projects, which is in the right direction. In Appendix-III,the projected profile of the Institute is given in a diagramatic form.

It is desired that the Director of the Institute should be a scientist of eminence.

The selection of future Directors should be made by a search committee (within the provision of Statute 21 of NEHU).

Finally, the council may take steps to introduce Ordinance/ Regulations, if necessary, to implement the proposal given.

Taking all the above factors into account the following recommendations of the committee are made:-

1. The committee recognises the importance of pursuing interdisciplinary research work in NEHU and suggests that the action taken by the Vice Chancellor in continuing the activities of the Institute under the leadership of Prof. K.P.Sinha ,be approved.

2. The status of the Director of the Institute will be that of a Dean of a School and he will be a member of various NEHU bodies as per the existing Statutes and Ordinances.

3. The committee agrees with the proposal of the Institute faculty and endorsed by the Institute Board to change its name to the "INSTITUTE OF FUNDAMENTAL RESEARCH" with current thrust on complex systems (both living and non-living). The name is broad enough to embrace the expertise of future Directors.

Contd/.../-

4. Some measures of autonomy is desirable in the functioning of the Institute for matters involving research, finance and administration. It recommends that steps towards this be approved.

5. It recommends that the UGC should provide adequate infrastructural facilities along with recurring expenses at a level similar to a science department of the NEHU engaged in experimental and theoretical work. The proposed budget proposal should be sent to the UGC for grants immediately.

6. The committee approves the continuation of the Institute Board, with function similar to the School Boards, as it exists now. In addition, there should be a Board of Studies of the Institute with functions similar to BPGS. The constitution of such a body has already been recommended by another committee of the Academic Council.

With above corrections the Report and Recommendations of the committee have been aproved.

SIGNED

Prof. K. Chatterjee Prof. C.S. Shastry Prof. A.N. Rai

Prof. H. Junjappa Prof. K.P. Sinha

dated 23.6.1992.

R-I

1. D.O. letter No.PA/JS(NfE)/90 dated June 18,1990 from Mr. D.P.Hira to Prof. Iqbal Narain,V.C.NEHU.

2. D.O.letter No.NEHU/VCF.14-1/90-1578 dated 16.7.90 from Prof. Iqbal Narain to Prof. Yashpal,UGC,Chairman.

3. Annexure"C" and "D" of the Agenda papers of the 43rd meeting of the Academic Council,NEHU.

4. D.O letter No.NEHU/VCF 14-1/90-1839 dated 27.8.90. Annexure "G" of 43rd A.C. meeting.

5. Prof. Yashpal's (UGC,Chairman)letter to Prof.I.Narain,V.C. NEHU,dated 24.7.90,Annexure "F" of 43rd A.C.meeting.

6. The letter of Chairman,UGC(Prof.Yashpal) D.O letter No.F.6-5/ 90(M) dated 12.9.90,Annexure "H" of 43rd A.C meeting.

7. Ad. No.5-5-F/XL/Estt-II/90-688 f dated 28th Nov.1990-Response to be sent to V.C. "Search Committee- ISOS&B" by 15th Dec.1990.

8. F.1-28/Biophysics/89-2168

9. Minutes of the Institute Board Meeting held on 28th Oct.1991 at the Institute premises.

10. Letter from Prof.K.P.Sinha(Director) to Prof.I.Narain,V.C, NEHU:F.1-28/Biophysics/89-2169 dated 6th July,1991.

11. Letter from Prof.K.P.Sinha to Prof.I.Narain,V.C,dated 21st August,1991 giving the rationale of the change of name.

12. Letter (F.3-5/Biophysics/87-2179 dated July 17,1991 enclosing comments on the UGC Report)from Prof.K.P.Sinha,Director,ISOS&B to Vice Chancellor,NEHU,Annexure "E" of the 43rd A.C meeting

Academic profile of the faculty and students

Name and Designation	Qualifications	Specialization	Current Interests
K.P.Sinha (Professor and Director)	M.Sc(Alld)Ph.D(Puna) Ph.D(Bristol) F.N.A,F.A.Sc,F.N.A.Sc, F.I.C.C.members,N.Y Academy of Science,ICTP, Acad of Commonwealth etc. Bhatnagar Prize + many other honours and awards,many medals(both national and International).	Science of Condensed Matters and Theoretical Physics.	Supercohductivity,Evolution and co-existence of order in comple systems,neural networks,gravita tion and cosmology,theoretical physics in general.
R.P.Bajpai (Professor)	M.Sc(AMU) Ph.D(Glasgow), gold medals,and Murad Medal.	Theoretical particle Physics.	Biophotons,Neural Network, Dynamical systems.
Vinod Singh (Reader)	M.Sc(Kanpur) Ph.D(Kanpur) gold medalist,and visiting awards from U.S.Institution, Rockefeller Foundation Fellow.	Life Science,Biology	Immunology,Molecular Biology, Drug Targeting.
Satish Kumar (Reader)	M.Sc(BHU), Ph.D(Utkal University) PDF,University of Tokyo.	Statistical mechanics, Field theory,Many Body Problems.	Coherence in Biologic l system, Bio-chemiluminescenee,Theoretical studies on High Temperature Superconductors.
Phlisdamon Nongkynrih (Senior Lecturer)	M.Sc(Physics) NEHU, M.Phil, Ph.D(NEHU)	X-ray and spectros-copic data(experimental physics)	Electromagnetic Signature of Biological Clock,Effect of Trace element on growth of plants.

Contd/.../-

	Qualifications	Specialization	Current Interests
Debjani Roy (Senior Lecturer)	M.Sc(Guwahati) Ph.D(NEHU) PDF.of Many institution in Europe,INSA visiting fellow for 1992-93.	Developmental physiology	Neuroethology, Electrophysiology.
P.K.Bajpai (Lecturer)	M.Sc(BU,Jhansi), Physics, Ph.D(NEHU)	Phase transition in solids	Ultraweak photon emission from living systems, conformal phase transition in biomolecules.
R.H.Duncan Lyngdoh (Lecturer)	M.Sc(Chemistry)(NEHU) Ph.D(I.I.T),Madras)	Quantum Chemistry	Theoretical Investigation on Mutation Model of Cancer, Topological and Quantum Chemical Methods in the design of Drugs
Research Scholars			
B.G.Mathew	M.Sc(Manipur University)	Physical Chemistry	Research supervisor:Dr.Satish Kumar,Ph.D thesis submitted on "Some Energy Dissipative Processes of Living Systems"
James Haorah	M.Sc(NEHU)	Biochemistry	Dr.R.H.Duncan(Research Supervisor)
Sanjay Kshettriya	M.Sc(NEHU)	Biochemistry	Dr.Vinod Singh(Research Supervisor)
Anil Kumar Mavila	M.Sc (Bangalore)Gold Medalist)	Bio-chemistry	Dr.Vinod Singh(Research Supervisor)
Jayati Sengupta	M.Sc(I.I.T,Kanpur)	Chemistry	Dr.R.H.Duncan Lyngdoh(Research Supervisor)

Research Scholars

Divi Venkateshwarloo	M.Sc (S.V.University, Tirupati)	Chemistry	Dr. R.H.Duncan Lyngdoh(Research Supervisor)
Vijay Kumar Sharma	M.Sc (Calcutta University)	Physics	Dr.Phlisdamon Nongkynrih(RS)
Paul San San Dkhar	M.Sc(NEHU)	BioChemistry	Dr.Phlisdamon Nongkynrih(RS)
Batshai Kharsamei	M.Sc(NEHU)	Biochemistry	Dr.R.K.Bajpai (RS)
Sain Kur Singh Majaw	M.Sc(NEHU)	Biochemistry	Dr.Vinod Singh (RS)

APPENDIX-II

Publications of the Faculty and Research Scholars of the Institute:-

K.P.Sinha(joined in 1971)

1. The polarizability of the Lochon-Fermion Interactions in the Cuprate Superconductors,K.P.Sinha,Solid State Commun.79,735(1991).
2. Have we known the mechanisms of High Temperature Superconductivity for a long time?.K.P.Sinha,Indian J.Phys.66A (1 82).1(1992).
3. High Temperature Superconductivity,Current Results and Novel Mechanisms, K.P.Sinha and S.L.Kakani (Nova Science Publishers, New York:1992).
4. Diras spinors in an Inhomogeneous Cosmological Model,S.K. Srivastava and K.P.Sinha,Int.J.Theoret.Phys,to appear.
5. Bond Polarization Mechanism for the Superconductivity of Doped C_{60} systems, K.P.Sinha,Solid State Commun.June(1992)
6. Interaction Mechanisms in Cuprate and fullerene superconductors, K.P.Sinha,Invited paper submitted to be presented at ICMAS-92 conference, Paris 21-22 Oct.92.

R.P.Bajpai(joined in 1986)

7. Behaviour of neural network with three spin interactions,R.P. Bajpai and P.Shukla,Phys.Rev.A42,5006(1990).
8. Possible varieties of states consistent with Frohlich conjecture in Molecular and Biological Physics of Living Systems (Kluwer,1990).
9. Ultra weak photon emission in germinating seeds:A signal of Biological Order, R.P.Bajpai,P.K.Bajpai and D.Roy.J.Bio.Chemilum.6, 227(1991).
10. Biophotonic emission as a potential probe of the organisational structure, P.K.Bajpai and R.P.Bajpai, Ann.Appl.Infor.Sci.17,49(1992).
11. A fact technique for investigating the effects of Biocides in lichens, P.K.Bajpai,R.P.Bajpai and G.P.Sinha,Int.Biodeterioration and Biodegradation 29,(1992).
12. Light Induced Biophotonic Emission from plant tissues,R.P.Bajpai and P.K.Bajpai,J.Bio.Chemibum.7, (1992).

Contd/.../-

Dr.Vinod Singh(joined in 1986)

13. Monoclonal anti-gonodorgopin releasing hormons entibodies produced by azo-LHRH preferentially recognize to native hormons. Vinod Singh,Indian J.Exp.Biol.26, 252,(1988).

14. Influence of C-ferminus cerbocyl group of luteinizing hormons (LHRH) on the recognition ability of anti-LHRH antibodies, Vinod Singh,Indian J.Exp.Biol. 26, 905(1988).

15. Immunobiology of human chorionic gonadotropin,S.K.Gupta and Vinod Singh,Indian J.Exp.Biol.26, 243(1988)

16. In vovi characteristics of polyclonal and monoclonal anti-LHRH antibodies in evulation inhibition and estrus suppression Vinod Singh and U.K.Srivastava,Indian J. Exp.Biol.26, 819(1988).

17. Immunochemistry of luteinizing hormons releasing hormons(LHRH). Vinod Singh in Neuroendocrine Regulation in Fertility Control, Biotechnology series Vol.I. Ed.V.Singh and K.Murlidhar,NEHU Publications,Shillong,pp.67-82(1989).

18. Monoclonal anti-gonadotropin relea sing hormone(GnRH) antibodies reacting to sequence of GnRH preferentially recognize to native ho one, Vinod Singh,Indian J.Exp.Biol.27,1,(1989).

19. Use of blocking ELISA additivity test..... Vinod Singh, Indian J.Exp.Biol.27,4(1989).

20. Harmonotoxins:I, strategy for synthesis of ovine luteiniz ing hormons-gelonin conjugate becoming toxin in the bita-subunit, Vinod Singh and M.R.Sairam,Inf.J.Peptide and Protein Res.33, 22(1989).

21 Harmohotoxins Preparation and characterization of ovine luteinizing hormone-gelomin conjuga te, Vinod Singh,M.R.Sairam,G.N.Bhargavai and R.G.Akhras,J.Biol.Chem.264,3089(1989)

22. Effect of thiolatin of aminogroups of ovine lutropin on immunoreactivity, receptor binding and bioactivity,Vinod Singh and M.R. Sairam,Mol.Cell.Endocrinol.63, 255(1989).

23. Effect of Thiolation on the immunoreactivity of the ribosoms inactivating protein gelonin,Vinod Singh and M.R.Sairam,Biochem. J.263,417(1989).

Contd/.../-

24. Harmonotoxins:conjugation of human choric gonadotrppin with the ribosome inactivating protein gelonin and comparis n with a lutropin conjugate, Vinod Singh and M.R.Sairam,Mol.Cell.Endocrinol. 67,217(1989).

25. Harmonotoxins:Effects of modifying the gonadotropin alpha-subunit on the generation of lutropin-toxin conjugates, Vinod Singh and M.R.Sairam,Int.J.Peptide and Protein Res. 35,46(1990).

26. Design a nd systhesis of bioeffective harmonotoxins for selective elimination of gonadal cells. Vinod Singh in "Horizons in Endocrinology" Vol.II Ed. M.Maggi and V.Geenen, Serono symposia publications, Raven Press, 76,197(1991).

27. In-vitro selective killing of gonadal tumor cells by a harmonotoxin composed of ovine lufeinizing hormone linked by a disulfide bond to a ribosome-inactive protein gelonin,Vinod Singh and Chandana Das,Biochemistry International,24,689(1991)

28. Effect of thiolation of aminogroups of gelonin on its protein biosynthesis inhibitor activity,Vinod Singh,Biochemistry International,24,677(1991).

29. Abrogation of ribosome-inactivating property of gelonin in the disulfide linked ovine luteinizing hormone-gelonin conjugates. Vinod Singh and Roy Curtise III.Biochemistry International,25, 531(1991).

30. Effect on immunoreactivity of gonadotropin releasing hormone (GnRH) in the GnRH-BSA conjugates of variable stoichiometry, Vinod Singh,Biochemistry International,25,509(1991).

31. Harmonotoxins:Synthesis,Characterization and bioefficacy of some defined disulfide linked conjugates of ovine luteinizing hormone with a ribosome-inactivating protein,gelonin, Vinod Singh, Indian J.Exp.Biol.29,916(1991).

32. Determinant analysis and interaction studies on monoclonal antibodies to bovine Ig G,IgG$_2$. S.K.Kar,A.R.Nayak,B.Joshi and Vinod Singh,Indian J.Biochem.and Biophys,29,25(1992)

33. Properties of a ribosome-inactivating protein,gelonin purified from three different methods,Vinod Singh and S.K.Kar, Indian J. Biochem and Biophys. 29,31(1992).

Contd/.../-

34. Design of liposomes to improve incapsulation efficiency of gelonin and its effect on immunoreactivity and ribosome-inactivating property, Anis Alam, S.R.K. Bhuri, Anil K. Mavila and Vinod Singh, Mol. Cell. Biochem (in press).

35. Influence of immunogen modification on the gonadotropin-releasing harmone antibody immunoreactivity, Vinod Singh, Biochemistry International (in press).

36. Effect of lysine residue modification of ovine luteinizing harmone by heterobifunctional cross-linking reagent SPDP on subunit-subunit association, receptor binding and biological activity, Vinod Singh, Anil K. Mavila and Anis Alam, Indian J. Exp. Biol. (In press).

37. Harmonotoxins
Vinod Singh, In "Recent Frontiers in Reproduction Research" Ed. C. Das and J. Sengupta, Wiley Eastern Publishers, New Delhi (in press).

Satish Kumar (joined in 1990)

38. The non-exponnential decay pattern of the weak luminescence from seedings of Cicer, arietinum L. Stimulating by pulsating electric fields, B. G. Mathew and S. Kumar, Experientia. 348, 309 (1992).

39. An empirical function that fits to the non-exponential relaxation of excited Biological systems, B. G. Mathew and S. Kumar, Experientia (to be published).

40. Weak luminescence from catyledons of Cicer arientium 2, induced by sudden freezing and thawing....., B. G. Mathew and S. Kumar, photochemistry and photobiology B. to be published.

41. Weak luminescnece from r-irradiated whole seedling of cicer arietinum-B. G. Mathew and S. Kumar, paper presented in the International Symposium on Low level Radiation and the living state, Bombay March 13-15, 1992.

42. r-radiation induced weak luminescence: A nonjnvasive assay for oxidations radical reactions in irradiated liposome suspension, B. G. Mathew and S. Kumar, J. Photochem and Photobiology to be published)

Contd/.../-

P. Nongkynrih (joined in 1986)

43. Crystal structure of the substituted apatites-deviation from Vegard's Law, P. Nongkynrih, Y.S.T.Rao, S.K.Gupta and P.V.R.Rao, J.Material Science, 23, 3243(1988).

44. Trace Element Analysis of Coalfields of Meghalaya P.Nongkynrih, Records of G.S.I, Vol.113, Part IV.

45. Biological Clocks: Mechanisms and Developments, P.Nongkynrih and V.K.Sharma, J.Photochemistry and Photobiology B:(In press).

D. Roy (joined in 1986)

46. Food and Feeding habits of Rana Limnocharis Wiegmann, the Common frog species of Meghalaya, India, D.Roy, Asian J.Expl.Sci, 3, 1(1987).

47. A preliminary report on Early cell type-specific antibodies in Xeropus Laevis, D.Roy, Current Science, 58, (20), 1163(1989).

48. Animal breeding cycle of Rana limnocharis in the north eastern hills of India. D.Roy, Proc. Natl. Acad. Sci. India, 60(B)III.363(1990).

49. Characterization of a Meternal Type VI Collagen in Xeropus Embryos, A Otte, D.Roy et al., J.Cell.Biol. III, 271(1990).

50. Analysis of middle ear development in the clawed frog, Xenopus le vis, D.Roy and A.Elepfandt, Verh.ad.Zool Ges.83, 469(1990). (see also paper of the list)

51. Weak luminescence from the frozen-thawed root tips of Cicer Arietinum L, B.G.Mathew and D.Roy. J.Photochem.Photobiol.B: 12, 141(1992).

P.K. Bajpai (joined in 1988)

52. Infrared and Raman Studies of Distortive Structure Phase Transitions, Y.S.Jain and P.K.Bajpai, Vibrational spectra and structure, 17B, 17(1988).

53. Forroselectric phase transition in $(NH_4)_2BeF_4$ Possibility of Molecular Distortion Tupe of Transition, P.K.Bajpai, Phys.Status. Solidi, 159B, 101(1989).

54. Temperature dependence of linewidth of SO_4^{2-} modes in the Raman spectra of emmonium sulphate, P.K.Bajpai, Y.S.Jain and H.D.Bist. J.Raman Spedtroscopy, 21, 327(1990).

Contd/.../-

55. Psendo-spin-phonon cupling and Raman spectra of SO_4^{2-} modes in Ammonium Sulphate, P.K.Bajpai and Y.S.Jain, in Advanced in statistical physics of solids and Liquids (Ed.K.N.Pathak and S.Prakash), Wiley-Eastern, New Delhi (1990).

56. Study of the effect of biocides on Lichen using biophoton emission, P.K.Bajpai, R.P.Bajpai and G.P.Sinha, paper to be presented in the "2nd International Conference on biodeterioration of cultural property" Oct 5-8, 1992, Yokohama, Japan.

R.H.Dundan Lyngdoh (joined in 1988)

57. Alkylation of DNA Bases by Carcinogenic N-Nitrosamine Metabolities: A Theoretical Study, R.H.Duncan and G.S.Davies, Int.J.Quantum Chem. 35, 665 (1989).

58. Mechanistic clues to the Mutagenicity of Alkylated DNA Beses: A Theoretical Study, R.H.Duncan and G.S.Davies, J.Theor.Bio. 140, 345 (1989).

59. The Product Distribution of DNA Alkylation by N-Nitroso Compounds: An INDO SCF MO Theoretical Study, R.H.Duncan and G.S.Davis, J.Chem.Soc, Parkin Traus, 11, 2127 (1989).

60. Acceleration of self-consistent field convergence in semiempirical molecular orbital methods, R.H.Duncan, Indian J.Cehm. 30A, 739 (1991).

61. Promutagenic Role of Watoon-Crick Protons in Alkylated DNA Bases: A Molecular orbital study, R.H.Dunca, J.Bioscience. in press

62. Molecular Orbital Flucidations on Repair Mechanisms for Alkylated DNA Nueleosides, R.H.Duncan, J.Chem.Soc.Pernin Tracs.II. July (1992).

63. Generation of Ultimate Carcinogene from N-Nitroscmines and N-Nitrosamides; An INDOSCF MO Study, R.H.Duncan, Tetrahedron. To be published.

64. A Review on Theoretical Investigations on Chemical Carcinogenesis, R.H.Duncan, G,S.Davis and J.Haorah, Adv.Cancer.res. To be published.

65. Some Energy Dissipative Processes of Living Systems B.G.Mathew, Ph.D thesis submitted to NEHU, April, 1992.

Contd/.../-

APPENDIX III

Diagramatic Representation of the Institute Profile

(A) Functional

NEHU

VC - AC - EC

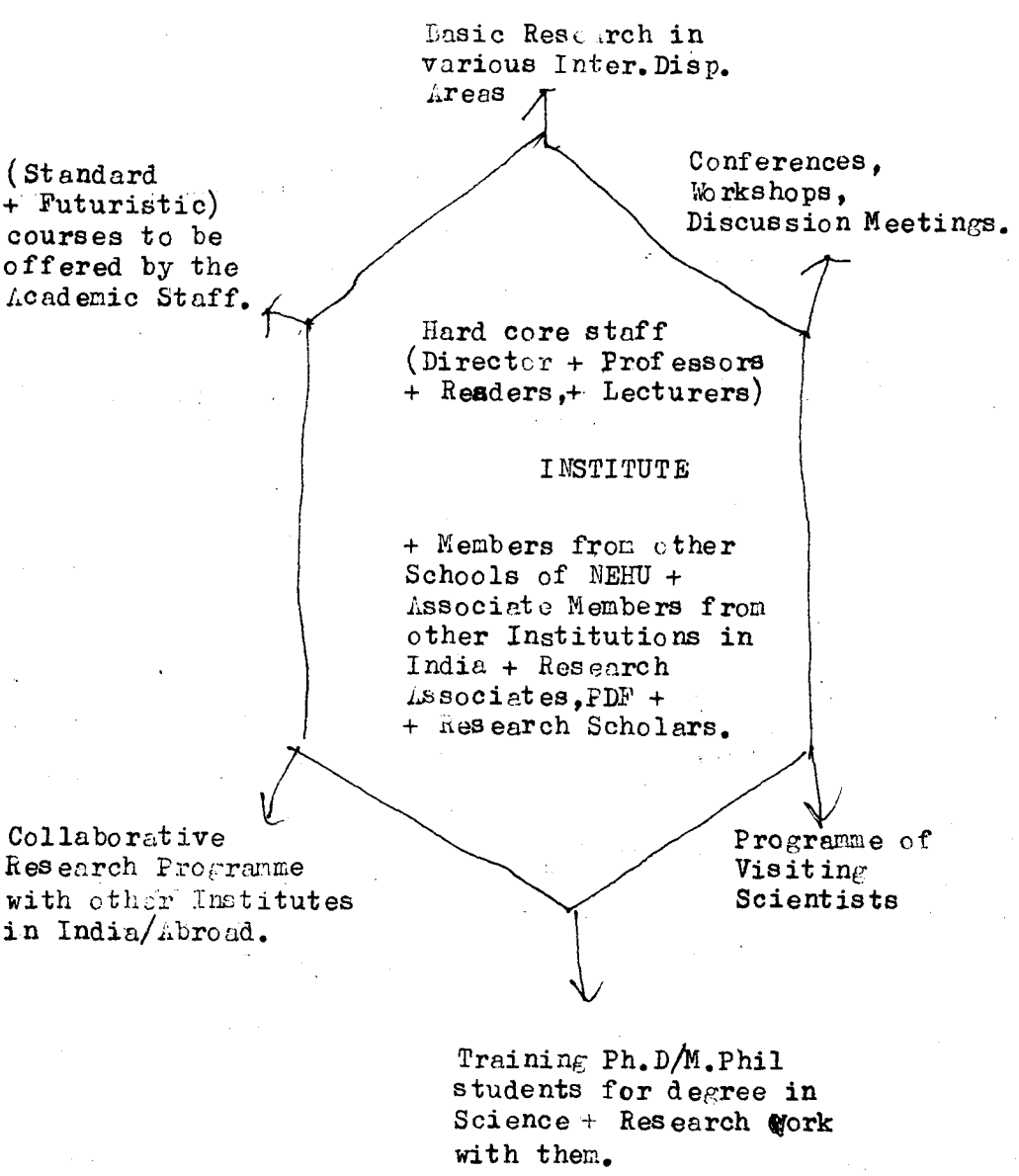
INSTITUTE LED

BY DIRECTOR HAVING STATUS AT LEAST OF DEAN OF A SCHOOL AND IS MEMBER OF ALL BODIES OF NEHU.

Boards of Academic Matters	Cell for Financial Matters	Cell for Administrative Matters.
(a) Institute Board presdided by the Director with external and internal members as it exists now.	Comprising Director + Professor 1 + Reader 1 + Accounts Officer 1	Director + 1 Professor + 1 Reader + 1 Lecturer
(b) Board of Studies of the Institute for Ph.D/M.Phil students similar to BPGS,		

For its growth/Reasonal Level of Activity the Institute will also acquire funds from other organisations such as UGC,DST,CSIR, DAE,ISRO,BIOTECHNOLOGY AND OTHER AGENCIES THAT SUPPORT RESEARCH PROGRAMME.

(B) ACADEMIC PROFILE



Research Projects in Hand from Different National and International Funding Agencies.

1. Theoretical Studies on High Temperature Superconductivity:Principal Investigator(PI) Prof.K.P.Sinha and Co-Investigator,Dr.S.Kumar,UGC grant approved in May 1992-from the funds for Emerging Areas.

2. Role of Conformation and Sequence recognizing anti-GnRH antibodies in molecular epitope mapping of a "self" deeapeptide GnRH and its receptors(PI) Dr. Vinod Singh,Feb.1989,UGC.

3. Protein-protein conjugation:The role of linkage and antibody characteristics and enzyme activity modulation,(PI) Dr. Vinod Singh , May, 1990, UGC.

4. Purification, biochemical and immuno-chemical characterization of guinea pig chorionic gonadotropin (gCG),(PI) Dr.Vinod Singh,June, 1988,CSIR.

5. Selective killing of Gonadal Cells by harmonotoxins, (PI) Dr. Vinod Singh, 1991. The Rockefeller Foundation , New York,USA.

6. Electromagnetic Signature of Biological Clock,(PI) Dr.P.Nongkynrih, 1990, Department of Atomic Energy.

7. Improving of Rice Production in Meghalaya (PI) Dr. P.Nongkynrih, Department of Science and Technology, Govt. of Meghalaya(approval awaited).

8. Grant from the German Agency for Technical Cooperation (GTZ),Eschborn, to Dr. D.Roy,1989-90.

9. DST,New Delhi, Yough Scientist Scheme Awarded to Dr. D.Roy,1990.

10. INSA-DFG Bilateral Exchange Programme of Konstanz,Germany to Dr. D.Roy.

11. Spectroscopic investigation of the functional mechanism of ribosome inactivating protein-gelonin,(P.I) Dr. P.K.Bajpai,1992,CSIR.

12. Theoretical Investigation of the Somatic Mutation Model of Cancer, (P.I) Dr. R.H.Duncan,Department of Atomatic Energy,1990.

Problems [illegible] courses in the two Departments of Sociology and Anthropology.

In accordance with the Dube Committee Report which was accepted at the 18th meeting of the Academic Council held on 26/28. .1983, the two Departments of Sociology & Anthropology are having the following common and Compulsory courses (8 in the first two semesters and 2 in the third semester):

1. Basic concepts
2. Family & Kinship
3. Stratification
4. Theories of Social & Cultural change
5. Economy and Society
6. Politics and Social structure
7. Planned Development and change
8. Culture, personality and Society
9. Methodology/Philosophy and Social Sciences
10. Techniques of Data Collection and Analysis.

In its meeting held on 14.12.9[illegible] the School Board of Social Sciences had a detailed discussion regarding the common courses running in the two departments and decided that the need to have 50% common courses should no longer be insisted as the respective Board of Post Graduate Studies have reviewed their course structures after servicing them for more than 4 years.

Further the faculty members of the Departments of Anthropology in their memorandum dated 27.4.92 submitted to the Vice-Chancellor, have expressed the difficulties of running the common course. The relevant extract of the memorandum reads as follows :

"Following the recommendations of the Dube Committee, the Departments of Sociology and Anthropology are having 2 common papers in each semester from 1985 itself. While this arrangement has reduced the load of the teachers of this department, it has created other problems. One, due to the lack of a sizable room in the department itself, the teacher concerned is always worried about the availability of a classroom for taking the common classes. Two, more importantly, the students of this Department always miss the initial classes of the papers offered by Sociology Department due to practical examinations in the department continuing much after the written examinations are over. Third, most importantly, the students of both departments do not get proper orientation as the foci of interest are different in sociology and anthropology- complex/industrial societies in the case of the former and tribal/simple societies in the case of the latter".

In view of the difficulties and in line with the School Board's decision, the faculty members of the Department of Anthropology have requested for bifurcation of the courses of the two Departments of Sociology-Anthropology.

The matter is placed before the Council for consideration.

5:8:3(1)

(iii) UGC Guidelines on the USIC-Redesignation of Staff.

The Academic Council in its meeting held on 27th June'1991 had accepted the UGC Guidelines on the USIC in toto, However, the Executive Council in its meeting held on 9th March'1992 resolved to accept the Guidelines as prescribed by the UGC ~~letter~~ desired that the provisions for re-designation of staff to teaching cadres be re-examined carefully by the Academic Council.

In view of the above decision concerning re-designation of staff, an extract of provision No.9 and Annexure-VI of the Guidelines are placed at Annexure 'A' for consideration of the Academic Council.

(iii) UGC Guidelines on the USIC-Redesignation of Staff.

The Academic Council in its meeting held on 27th June'1991 had accepted the UGC Guidelines on the USIC in toto, However, the Executive Council in its meeting held on 9th March'1992 resolved to accept the Guidelines as prescribed by the UGC ~~Lentent~~ desired that the provisions for re-designation of staff to teaching cadres be re-examined carefully by the Academic Council.

In view of the above decision concerning re-designation of staff, an extract of provision No.9 and Annexure-VI of the Guidelines are placed at Annexure 'A' for consideration of the Academic Council.

ANNEXURE 'A'
As per the UGC Revised Guidelines

Provision No.9- Redesignation of staff and Rationalisation/Revision of Pay Scale

All redesignation of staff will be processed through a screening committee appointed by Vice-Chancellor.

a) Existing Staff

i) The existing PSOs, SSOs and SOs could be redesignated in the cadres of the teaching staff subject to the following conditions :

1. The incumbent satisfies the minimum educational qualifications and experience for the post as given in these guidelines.
2. The incumbent has teaching load in his or other departments and participates in other academic activities of the department related to instrumentation.
3. He/She has been selected by an appropriate selection committee of the University for University teachers otherwise he/she should appear before such a section committee.
4. He/She gives in writing concurrence to fulfil all the duties, including services, that are assigned to him by the Head of the Centre.
5. Those who do not satisfy the above conditions or do not desire academic designations will be appropriately redesignated in the cadre of Technical Officers.

ii) Technicians

The existing Senior Technical Assistants, Junior Technical Assistants, Technicians in the grades of Technician E to A, Laboratory Assistants and Helpers should be redesignated in Grade I to V on the basis of their pre-revised scales as given in 8(ii) above.

b) Redesignation of Technical Officers of Teachers

An incumbent in the cadre of Technical Officers can opt for redesignation to the corresponding teaching post in writing to the University authorities. The redesignations so done shall be subject to the conditions given in 9a (i).

c) Revision of Salary Scales

Pre-revised designations	Pre-rationalised scales	Rationalised scales	Revised designations	Revised Scales w.e.f. 1.1.86.
P.S.O.	1500-2000	1500-2500	T.O.(III)	4500-150-5700-200-7300
S.S.O.	1100-1600	1200-1900	T.O.(II)	3700-125-4950-150-5700
S.O.	700-1300	700-1600	T.O.(I)	2200-75-2800-100-4000.

5:8:3(3)

ANNEXURE - VI

Minimum qualifications for staff of USIC

A. Teaching staff

The teaching staff of the USIC shall have qualifications similar to those of the University teachers as per the UGC norms, with experience in any branch of instrumentation.

B. Technical Officers

Technical Officer I

Minimum qualification :

M.Sc/B.E/B.Tech. in instrumentation or allied field with atleast 55% marks or equivalent grade with good academic record.

Explanation :

i. M.Phil, M.Tech. and Ph.D in the relevant subject as desirable qualifications for recruitment to the post of Lecturer.

ii. Minimum qualifications should not be relaxed even in respect of candidates who have degrees like M.Tech./M.Phil./Ph.D.

Technical Officer II

Minimum Qualifications:

Ph.D/M.E./M.Tech. in instrumentation or allied field with atleast 55% marks or equivalent grade with good academic record.

Experience

Atleast 5 years experience in reputed laboratories/industries in production/maintenance/design of instruments.

Techincal Officer III

Minimum educational qualifications recommended are similar to those recommended above for the post of Technical Officer II. The candidate for this post should have experience of 12 years in a reputed laboratory/ industry of which atleast 5 years should be in a senior position and should also provide evidence of his achievements by way of high quality publications in instrumentation and/or patents related to new designs and processes in instrumentation.

contd/-....

C. Technical Staff

Grade V

Diploma in the required trade with 10 years experience in repairs and maintenance of instruments.

Grade IV

Diploma in the required trade with 1st class or diploma in required trade with 2nd class with 2 years experience.

Grade III

ITI certificate with atleast 7 years experience or a diploma in the required trade.

Grade II

ITI certificate with atleast three years experience OR HSC with 5 years experience in the required trade(in case I.T.I. certificate holders are not available).

Grade I

ITI certificate with 1 year experience in the required trade OR HSC with 2 years experience in the required trade (in case I.T.I. certificate holders are not available).

D. Administrative Staff

The essential qualifications for this category shall be as per University rules.

(iv) Proposal for review of seat distribution in the P.G. Departments - Amendment of Regulation 7 of OC-1.

According to the Regulation 7 of NEHU Ordinance OC-1,(Annexure-'I') the distribution of authorised seats in the Post-Graduate courses in the University is as follows:

i) Open category - 50%

ii) Reservation for SC/ST - 40%

iii) Discretionary seats with the Vice-Chancellor. - 10%

The discretionary seats with the Vice-Chancellor relate to special cases like students from Union Territories,those nominated by the Central Government/unrepresented backward areas/ disabled students/outstanding sportsmen/women etc. if any.

Over the years, the number of students from the SC/ST categories have considerably increased leading to great pressures. In addition, need has also been felt for making some special provisions for children of NEHU employees.

The Tribal Teachers' Association of NEHU also have in their letter to the University expressed concern over the number of SC/ST candidates who have not been getting admission to the P.G. Programmes due to limited number of seats in the Departments.

It is therefore, proposed to review the distribution of authorised seats as follows:

i)	Open category	-	50%
ii)	Reservation for SC/ST candidates	-	50%
iii)	Discretionary seats with the Vice-Chancellor.	-	10% over the allotted seats(Supernumerary).

The discretionary seats with the Vice-Chancellor in addition to the above categories is also proposed to include children of the University(NEHU) employees. These seats are also proposed to be converted to category (ii) above in the absence of applications from suitable candidates.

The revised Regulation 7 of Ordinance OC-1 will stand revised as at Annexure (II).

The matter is placed before the Academic Council for consideration and approval.

Annexure I

ON ADMISSIONS TO POST-GRADUATE DEPARTMENTS

1. The authorised seats for admission in each Department shall be as given in the Annexure.

2. Only those candidates who have passed a Three-Year Honours course in the relevant subject shall ordinarily be admitted to the Master's Course. However, upto ten per cent of the seats may be assigned to students from other disciplines.

Provided that the number of seats for other disciplines in the inter-disciplinary subjects, such as Education, Sociology, Anthropology may be increased upto fifty per cent.

Provided further that if teaching of honours in a subject has not been sufficiently developed within the jurisdiction of the University or in any unit in particular, seats in the concerned Departments may be filled in a manner as may be decided by the Academic Council in the recommendation of the concerned Department.

3. The distribution of authorised seats in the Post-Graduate courses in the University shall be as follows :

(i)	Open category	- 50%
(ii)	Reserved for ST/SC candidates	- 40%
(iii)	Discretionary seats with the Vice-Chancellor	- 10%

Note: The discretionary seats will relate to special cases like students from Union Territories, nominated by the Central Government/unrepresented backward areas/disabled students/outstanding sportsmen/sportswomen, if any.

...2/-

4. In determining inter-se priority from amongst those claiming to hail from backward areas the level of literacy obtaining in that area may be taken as the guiding factor. For outstanding sports men/women, the level of participation at the inter-University, State or at the nationals within the last three years only shall be taken into account. Proficiency in performing arts should be supported by suitable documents.

5. Departments will prepare a consolidated list of all applicants for the total number of seats authorised by the University. 50% and if there are no special cases 60% of the seats should be filled up on merit and shall include SC/ST students who by merit can figure in the open list. From the remaining seats, a list of candidates belonging to SC/ST will be prepared and the seats will be filled up from those candidates in order of merit.

6. Departments may, if they consider necessary, conduct written test/interview for admission to the Port-Graduate programme in accordance with Ordinance OC-7. Performance of a candidate in the under-graduate course together with eligibility test, if any, shall be taken into consideration while preparing the merit list of students. Weightage for eligibility test/interview shall, however, not exceed 50%.

7. In case of all internal students, i.e. students who have graduated from colleges affiliated to or maintained by the University, 10% marks shall be added to the subject concerned. In the case of those candidates who have not offered the subject in the Honours no such weightage shall be given and their marks in the honours subject shall be taken into account.

...3/-

8. All Departments shall constitute Admission Committees and assign them specific responsibilities. Such Committees will also be constituted in each Campus and shall include one representative of the Head of the Department.

9. Students who have already obtained a Master's Degree from this University or any other University, will be considered for admission only if there is any vacancy after considering all eligible candidates.

Regulation - 1
OC -1

Annexure - II

ON ADMISSION TO POST-GRADUATE DEPARTMENTS

(Ammended)

1. The authorised seats for admission in each Department shall be as given in the Annexure.

2. Only those candidates who have passed a Three-Year Honours Course in the relevant subject shall ordinarily be admitted to the Master's Course. However, upto ten percent of the seats may be assigned to students from other disciplines.

Provided that the number of seats for other disciplines in the inter-disciplinary subjects, such as Education, Sociology, Anthropology may be increased upto fifty per cent.

3. The distributions of authorised seats in the Post-graduate courses in the University shall be as follows :

i)	Open category	-	50%
ii)	Reserved for ST/SC candidates	-	50%
iii)	Discretionary seats with the Vice-Chancellor	-	10% over and above the authorised seats

Note: The discretionary seats will relate to special cases like students from Union Territories, those nominated by the Central Government/unrepresented backward areas/disabled students/outstanding sportsmen/sportswomen, if any, and the children of the University (NEHU) employees. These supernumerary seats will stand converted to category (ii) above in case the seats are not filled up by such categories of candidates.

4. The determining inter-se priority from amongst those claiming to hail from backward areas the level of literacy obtaining in that area may be taken as the guiding factor. For outstanding sportsmen/women, the level of participation at the inter-University, state or at the nationals within the last three years only shall be taken into account. Proficiency in performing arts should be supported by suitable documents.

Contd...

5. Departments will prepare a consolidated list of all applicants for the total number of seats authorised by the University. 50% of the seats should be filled up on merit and shall include SC/ST students who by merit can figure in the open list. From the remaining 50% seats, a list of candidates belonging to SC/ST will be prepared and the seats will be filled up from those candidates in order of merit. Any or all of the supernumerary seats of 10% over and above the authorised seats under category (iii) will stand converted to category (ii), if unfilled.

6. Departments may, if they consider necessary, conduct written test/interview for admission to the Post-graduate programme in accordance with Ordinance OC-7. Performance of a candidate in the under-graduate course together with eligibility test, if any, shall be taken into consideration while preparing the merit list of students. Weightage for eligibility test/interview shall, however, not exceed 50%.

7. In case of all internal students, i.e. students who have graduated from colleges affiliated to or maintained by the University, 10% marks shall be added to the subject concerned. In case of those candidates who have not offered the subject in the Honours, no such weightage shall be given and their marks in the honours subject shall be taken into account.

8. All Departments shall constitute Admission Committees and assign them specific responsibilities. Such Committees will also be constituted in each Campus and shall include one representative of the Head of the Department.

9. Students who have already obtained a Master's Degree from this University or any other University, will be considered for admission only if there is any vacancy after considering all eligible candidates.

In taking cognisance of the above facts it is proposed to make a slight ammendment to the Ordinance by inserting the words "or special circumstance" to read as follows "A Special Convocation for the purpose of conferring Honorary degrees or special circumstance may also be held at such time as may be found necessary by the Executive Council in accordance with the procedure laid down in Statute 29(1) and (2) of the Schedule, NEHU Act, 1973."

If the ammendment is approved and a special Convocation is decided to be held at Itanagar for the graduates of NERIST it will also be necessary for the Council to decide whether the corporate bodies of NERIST are also to be included in the Academic procession as special case.

The matter is placed before the Council for consideration.

Holding of Special Convocation for the degree-holders of NERIST in various branches of the Engineering in 1992.

The Director, North Eastern Regional Institute of Science and Technology has approached the University with a request to hold a Special Convocation so that the degree holders of NERIST may get their degrees which is necessary both for the purpose of the higher education and employment. NERIST is an institution which is first of its kind in the North Eastern Region. Since this is the first batch of degree holders coming from NERIST both the authorities of NERIST and the State Government of Arunachal Pradesh are keen to have the Convocation at Itanagar(Nirjuli): Hence the request for holding the Convocation.

The Ordinance OC 10 of the University on Annual Convocation reads as "A Convocation for the purpose of conferring degrees shall ordinarily be held once in a year on such date and place as may be fixed by the Vice-Chancellor with prior approval of the Chancellor" and a Special Convocation as "A Special Convocation for the purpose of conferring Honorary degrees may also be held at such time as may be found necessary by the Executive Council in accordance with the procedure laid down in Statute 29(1) and (2) of the Schedule, NEHU Act, 1973."

Having Annual Convocation of NEHU at Itanagar would not be feasible on logistic grounds and again the Ordinance governing Special Convocation as it exists is for the purpose of conferring Honorary Degrees and hence would not be applicable to the proposal made unless ordinance is duly ammended.

Again the Institute has the following Body Corporates :

a) NERIST Society (Court)
b) Board of Management
c) Academic Committee.

Contd...

(vi)Nomination of External experts to the School Board.

In accordance with the provisions under clause 1(vii) of Ordinance OA-7, the following persons have been recommended for nomination as external experts to the School Board of Agricultural Sciences & Rural Development. The nomination is to be made by the Academic Council.

The matter is placed before the Council for consideration.

1. Dr. C.K.Raj Kumar, Dean,
   Veterinary College,
   Assam Agricultural College,
   Lakhimpur (Assam).
2. Dr. A.K.Roy,
   Director Research,
   Assam Agricultural University,
   Jorhat - 13 (Assam)
3. Dr. K.N.Singh,
   Asstt. Director General,
   (NARP) ICAR Krishi Anusandhan
   Bhawan, PUSA, New Delhi-110012
4. Dr. CBS Rajput,
   Prof. & Dean,
   Deptt. of Horticulture,
   Institute of Agril., Sciences,
   B.H.U. Varanasi (U.P)
5. Dr. Dilip Kumar Mazumder,
   Prof. of Agronomy,
   Palli Siksha Bhawan
   (Institute of Agriculture)
   P.O. : Sriniketan
   Distt : Birbhum, Pin-731 236,
   West Bengal.

(vii) Proposal of the Freedom Fighters' Association of Meghalaya for instituting an award in order to commemorate the Khasi Freedom Fighter, Late U Tirot Sing.

The Freedom Fighters' Association of Meghalaya State has given an offer of award of Prize Book to the tune of Rs.2000/- only to the University, in order to commemorate the Khasi Freedom Fighter hero, Late U Tirot Sing. The Prize Book is to be regulated out of the interest accrues to the above sum to be kept in the fixed deposit of the University.

Accordingly, on receipt of the proposal, a Committee was constituted by the University to examine the proposal. The Committee of U Tirot Sing Memorial Prize met on 10th April, 1992 and submitted a Minutes of its recommendation vide annexure - I.

From this recommendation, the Committee requested the University to accept the proposal and kept in the fixed deposit on long term basis for earning maximum possible interest, which may be decided by the Finance Officer.

Next, the Committee after having been considered that the interest value out of would be credited amount would be too small to purchase the Prize Book for the purpose of the Prize Award and thus has further recommended that a matching grant from the University side to the amount of Rs. 2000/- is necessary bringing the total endowment to Rs. 4000/- in all to be kept in the fixed deposit. This will enable the interest meant for utilisation to come up to Rs.400/- In this respect Finance Department had been consulted who on its turn has agreed that a matching grant of Rs. 2000/- is feasible under the Head Part I (NB) 13 Other Misc (i) Other unforseen contribution.

It may be stated for the information of the Council that to regulate this award, certain procedural norms will have to be formulated like in the cases of Sarat Chandra Memorial Prize Award and M.K.Khare Memorial Prize Award already with the University and awarded by History Department and Zoology Department respectively. In this case perhaps, the Political Science Department will have to take as a Department which will award the Prize to the student who secured the highest mark in the Political Science in the Degree Pass Course.

The matter is placed before the Council for consideration and approval.

5:8:7(2)

C O P Y Annexure - I

F.No.G.45-26/Acad/Don/91-2491 April 10, 1992.

MINUTE OF THE MEETING OF THE COMMITTEE ON U TIROT SINGH MEMORIAL PRIZE ENDOWMENT FUND

The Committee of "U TIROT SING MEMORIAL PRIZE" met today, the 10th April, 1992, in the office room of the undersigned at 12.15 p.m. The following members were present :

1. Prof. J.C. Binwal, Librarian
2. Prof. A.K. Barua, Political Science Department
3. Mr. E.J. Mawlong, Finance Officer
4. Prof. S.N. Guhathakurta, Dean, School of Social Science (in the Chair).

I. The Committee considered the application dated 17.9.91 addressed to the Vice-Chancellor, from Mr. Bimal Sengupta, President, Meghalaya State Freedom Fighters Association, requesting the University to accept an endowment fund of Rs. 2,000/- in the name of the Association for awarding a prize out of the interest of the amount, to the student securing highest mark in Political Science in B.A. (Pass) examination every year.

2. The Committee decided that the amount may be accepted by the University and kept in fixed deposit on a long term-basis to earn maximum possible interest. The actual manner of deposit may be determined by the Finance Department.

3. The Committee felt that, in view of higher cost of books, reasonably good quality and presentable books may not be available with Rs. 200/- which may accrue out of the interest of the endowment fund of Rs. 2,000/-. The Committee, therefore, recommends that the University may make a matching grant of another Rs. 2000/- to make the total endowment of Rs. 4,000/- and keep the same as fixed deposit on long term basis so that the annual interest may accrue to the tune of about Rs. 400/- or so, and the interest money may be utilized every year for the purchase of books for awarding the prize to the student securing highest marks in Pol. Science in B.A.(Pass) Examination every year.

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

Sd/-
S.N. Guhathakurta
Chairman,
U Tirot Singh Memorial Prize Committee
and
Dean, School of Social Sciences
NEHU, Shillong.

c.c. to all members &
Registrar, Mr. A.Patton,
NEHU, Shillong, for
information & n/c.

(viii) Additional qualification for admission to the M.Sc programme in Chemistry.

Normally under the existing provisions of the University, candidates possessing an Honours Degree in the relevent subject, are eligible to seek admission to the Post-Graduate programme.

The Head, Department of Chemistry desires that for admission to M.Sc Chemistry, in addition to B.Sc Honours in Chemistry, applicants should also have had Mathematics as one of the subjects at P.U. level or equivalent. The matter was considered by the School Board of Physical Sciences in its meeting held on 8th, June, 1992 and the Board decided to recommend the request to the Academic Council for consideration.

The matter is placed before the Council for consideration.

(ix) Allocation of surrendered state seats of B.Sc.(Ag.) to Nagaland.

The Academic Council in its 43rd Meeting vide resolution No:AC:43:29:5:08:(v) approved the recommendation of the School Board for allocation of seats to various States/categories. It did not however, approve that the surrendered quota seats would be decided by the Dean on need cum merit basis. Earlier these surrendered seats used to be given to Nagaland State. In view of the local needs, it is suggested that surrendered quota seats should be allocated to Nagaland State.

The matter is placed before the Council for consideration.

6:3 – Leave etc.

(i) Review of Study Leave Rules.

The report of a Committee proposing review of Study Leave Rules was placed before the 43rd meeting of the Academic Council held on 3/4.3.92. The Council considered the matter but desired that in the rules for admissibility of pay & allowances where financial assistance is received by a teacher on study leave, it should be specified that the rules do not apply to a person receiving financial assistance in the form of honorarium. The Council decided that the rules re re-examined by the Committee.

The Rules have been re-examined by the Committee in its meeting held on 22.6.92. The minutes of the Committee meeting is placed at Annexure- A for perusal of the Council.

The matter is placed before the Council for consideration of adoption of the Study Leave Rules proposed by the Committee.

MINUTES OF THE MEETING OF THE COMMITTEE FOR REVIEW OF STUDY LEAVE RULES HELD ON JUNE, 22. 992.

Members present:

1. Prof. A.L. Verma
2. Prof. M.K. Choudhury
3. Prof. K. Chatterjee (Co-ordinator)

The Committee discussed the University Ordinances and the University Grants Commission guidelines and recommended the following modified Ordinance on Study Leave:

Study Leave:

10(i) Study leave may be granted to a permanent whole time teacher with not less than three years continuous service to pursue special line of study or research or to make a special study of the various aspects of University organisation and methods of education.

Provised that the Executive Council may, in special circumstances, waive the condition of three years service being continuous.

Explanation: In ascertaining the length of service, the period during which a person was on probation or engaged as a research assistant may be reckoned, provided

(a) the person is a teacher on the date of the application and

(b) there is no break in service.

(ii) Study leave shall be granted on the recommendation of the concerned Department/Centre and the School Board. The leave shall not be granted for more than two years save in very exceptional cases in which the School Board and Excutive Council is satisfied that such extension is unaboidable and academic grounds and necessary in the interest of the University.

(iii) Study leave shall not be granted to a teacher who has not served the University continuously for a period of three years after the expiry of the last spell of the extra-ordinary leave under clause 8(ii) or 8(iii) sabbatical leave or who is due to retire within two years of the date on which he is expected to return to duty after the expiry of study leave.

(iv) Study leave may be granted more than once provided not less than 5 yrs have elapsed after the teacher returned to duty on completion of the earlier spell of study leave or sabbatical leave.

Contd...2/-

Provided that in such cases of study leave where the substitute pay is borne partly or fully by any outside agency, one may avail the next spell of study leave after a period of three years only.

(v) No teacher who has been granted study leave shall be permitted to substantially alter the course of study or the programme of research without the permission of the school Board and Executive Council. When the course of study falls short of the study leave sanctioned, the teacher shall resume duty on the conclusion of the course of study unless previous approval of the Executive Council to treat the period of short fall as extra-ordinary leave has been obtained.

(vi) Study leave cannot be combined with any other leave. However, a suitable leave (e.g. Special Casual Leave) should be granted to cover the journey period.

(vii)(a) Subject to the provision of sub-clause (viii) and (ix)below study leave may be granted on full pay for the first year and on half pay for the second year and no pay shall be admissible thereafter.

Provided that when a teacher is awarded a Fellowship/Scholarship by the Government of India/University Grants Commission in United Kingdom or any other bonafide agency for which the University nomination was forwarded, the pay of the teacher shall be governed by the condition stipulated for the award.

NOTE:- The term pay refers to average pay and shall be calculated as mentioned in clause 21 of this Ordinance.

(b) That while house rent allowance shall be allowed, compensatory allowance shall not be allowed during the period of study leave.

(viii)That the scholarship, fellowship, honorarium, maintenance allowance or financial assistance in any form other than regular employment received by a teacher granted leave shall not (repeat not) be taken into account in determining the pay and allowances on which the study leave may be granted.

(ix) The following guidelines may apply while determining the admissibility of pay and allowances where financial assistance in the form of regular or part-time employment is received by a teacher granted study leave in addition to fellowship, etc. as per clause (viii)

(a) $25,000 or above per annum - leave shall be granted without pay.

(b) $15,000 and above but less than $ 25,000 per annum leave on half pay.

(c) Less than $ 15,000 per annum leave with full pay.

Contd....3/-

NOTE: It shall be the duty of the teacher availing study leave to communicate immediately to the University the additional financial assistance in any form received by him during the course of study leave from any person or Institution whatsoever.

(x) A teacher granted leave shall on his return and rejoining the service of the University be elligible to the benefits of the annual increment(s) which he would have earned in the course of time if he had not preceeded on study leave. No teacher shall, however be elligible to receive arrears of increments.

(xi) Study leave shall count as service for pension/CPF provided the teacher rejoins the University on the expiry of his study leave and the leave for journey period as per (vi).

(xii) Study leave granted to the teacher shall be deemed to be cancelled if it is not availed of within 12 months of its sanction.

Provided that where the study leave granted has been so cancelled, the teacher may apply again for such leave.

(xiii) A teacher availing the study leave shall undertake that he shall serve the University for a continuous period, equal to the period of study leave actually availed, from the date of his resuming duty after expiry of the study leave.

(xiv) A teacher:-

(a) Who is unable to complete his studies within the period of study leave granted to him, or

(b) Who failed to rejoin the service of the University on the expiry of his duty leave and leave for journey period, or

(c) Who rejoins the University but leave the service without fulfilling the conditions laid down in (xiii) after the date of rejoining the service, or

(d) Who within the said period is dismissed or removed from service by the University shall be liable to refund to the University the amount of leave salary, allowance and other expenses incurred on the teacher or paid to him on his behalf i in connection with the course of study, or such amount as may be decided by the Executive Council from time to time if the teacher is allowed to go abroad for study leave, together with interest thereon at the rate of 6% per annum.

Explanation: If a teacher asks for extension of study leave and if not granted the extension but does not rejoin on the expiry of the leave originally sanctioned he will be deemed to have failed to rejoin the service on the expiry of his leave for the purpose of recovery of the dues under this Ordinance.

.Contd...4/-

(a) Not-withstanding the above, the Executive Council may order that nothing in this Ordinance shall apply to a teacher who within three years on return to duty from study leave is permitted to retire from service on medical grounds.

Provided further that the Executive Council may, in any other exceptional case, waive or reduce, for reasons to be recorded, the amount refundable by a teacher or the period as per (xiii) under th-is Ordinance. The Executive Council may also extend the period of leave in exceptional exigencies for a suitable period.

(xv) After the leave has been sanctioned, the teacher shall, before availing of the leave, execute a bond in favour of the University binding himself for the fulfilment of the conditions laid down in sub-clause (xiii) and (xiv) above and give security of immovable property to the satisfaction of the Finance Office or a Fidelity Bond of an Insurance Company, or a Gaurantee by Scheduled Bank or furnish security of two permanent teachers for the amount which might be refundable waive clause (xiv) above.

(xvi) The teacher shall submit to the Dean six monthly report of progress on his studies forwarded by his supervisor or senior associate or the Head of Institution. This report shall reach the Dean within one month of the expiry of every six months of the study leave. If the report does not reach the Dean within the time specified the payment of leave salary may be deferred until the receipt of such reports.

NOTE: On return from study leave, the teacher shall report to the University, through the Head of the Department, the nature of his work and his achievement. He shall also present a resume of his work in a School-level seminar, specially organised for the purpose by the Head of Department.

(xvii) The application for study leave should be sent through the Head of the Department/Centre to the School Dean concerned and the Head of the Department/Centre should give his/her recommendations taking into account the strength of the teaching staff for the particular subject. Except in very special cases, at no time more than 20% of the strength of the teachers on rolls shall be allowed to proceed on study leave, extra-ordinary leave and /or sabbatical leave.

.....

Corrigendum to the Agenda item No.3:6:4: to the Academic Council scheduled to be held on 7th of August 1992:-

1) The following lines may kindly be added at the end of the para in serial 9:-

The subjects not offered at PU level in the constituent or affiliated colleges may be an exception to it.

2) The words 'without major' after the words 'in order to pass the degree examination' in serial No.16 may kindly be added. Under sub para 'c' in serial No.16 a para c(i) may be added as under:

A student with major may be required to obtain the following minimum marks to pass the degree examination:-

i) 30% marks in each theory paper
ii) 40% marks in each practical paper
iii) A student securing 33% marks or more but less than 45% marks in aggregate the major subjects may be declared to have passed in simple pass, students securing 45% marks or more but less than 60% marks in the major subjects may be placed in second class and a student securing 60% marks or more in the major subjects may be placed in first class.

Corrigendum to item No.5:2:4-Revison of Syllabus for M.Sc Zoology.

Unit-4

1. Immune system of vertebrates in relation to parasitic infections; immunity to Schistosoma, hydatid, trichinella and filarial infections; evasive mechanisms in parasites

2. Epidemiology

3. Anthelminthics: possible mode of action.

Unit -5

1. Vaccine development against diseases: potential vaccines, characterization of stage-specific antigens, cloning and characterization of genes for immunization, identification of protective antigens using r-DNA techniques.

2. Probe technology for parasitic diagnosis: DNA probes; serodiagnostic methods.