Certificate in Amchi Science
[Durra – Pa/*Bum-Zhi Tradition*]

Council for Technical Education and Vocational Training
Curriculum Development Division
Sanothimi, Bhaktapur
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Table of Content

1. Introduction:

This competency based curriculum of "certificate in Amchi Science (Durra-Pa)" is designed to produce middle level technicians equipped with skills and knowledge of Amchi medicine for the management of human health disorders in the country.

2. Aims:

- To produce trained and competent middle level human resources in the area of Amchi medicine necessary for the country.
- To develop skills and abilities in the trainees about the principles and practices of Amchi medicine.

3. Objectives:

- To develop skills and knowledge on diagnosis of human health disorders.
- To develop skills and knowledge on medicinal raw materials and medications.
- To develop skills and knowledge on prevention and treatment of human health disorders.
- To develop skills and knowledge on preservation and promotion of human health.
- To develop competency in identifying and resolving community health problems.
- To develop basic skills and knowledge to diagnose and manage primary health problems of patients.
- To develop leadership skills and professional characteristics and attitudes required to play the role of Amchi health post manager.
- To develop necessary knowledge and skills for working in a variety of health care setting.

4. Course description:

This curriculum provides skills and knowledge necessary for Amchi health assistant. There will be both demonstrations by instructors and opportunity by the trainees to perform skills/tasks necessary for the technicians. Trainees will practise and learn skills using typical tools, materials, equipment and instrument necessary for the program.

The certificate in Amchi Science is a three years program. The first year focuses on basic science and language subjects; the second on subjects of Amchi medical science and the third year is given to the application of learned skill and knowledge within "comprehensive practice" in both the hospital and community settings.

Certificate in Amchi Medicine (Durra-Pa)

5. Course structure

a) First year

S.N.	Subjects:	Nature	Hours Distribution				Full Marks			Marks distribution for evaluation/Examination						All Total	Exam Hours		Remarks
			Hrs/ week	Hours/year						Internal Exam.			External Exam.						
				Th.	Pr.	Tot	Th.	Pr.	Tot	Th.	Pr.	Tot	Th.	Pr.	Tot		Th	Pr.	
1	English	T	3	120	-	120	100	-	100	20	-	20	80	-	80	100	3	-	
2	Nepali	T	3	120	-	120	100	-	100	20	-	20	80	-	80	100	3	-	
3	Anatomy and Physiology	T+P	4	120	60	180	80	20	100	16	8	24	64	12	76	100	3	3	
4	Botany	T+P	4	120	60	180	80	20	100	16	8	24	64	12	76	100	3	3	
5	Zoology	T+P	5	120	60	180	80	20	100	16	8	24	64	12	76	100	3	3	
6	Chemistry	T+P	5	120	60	180	80	20	100	16	8	24	64	12	76	100	3	3	Math:T Comp. Skills:P
7	Physics	T+P	4	120	60	180	80	20	100	16	8	24	64	12	76	100	3	3	
8	Mathematics, Statistics and Computer skills	T+P	5	120	60	180	80	20	100	16	8	24	64	12	76	100	3	3	
9	Himali (Lama) language.	T	3	120	-	120	100	-	100	20	-	20	80	-	80	100	3	-	
Total			**36**	**1080**	**360**	**1440**	**780**	**120**	**900**	**156**	**48**	**204**	**624**	**72**	**696**	**900**			

5. Course structure

b) Second year

S.N.	Subjects:	Nature	Hours Distribution				Full Marks			Marks distribution for evaluation/Examination						All Total	Exam Hours		Remarks
			Hrs/ week	Hours/year						Internal Exam.			External Exam.						
				Th.	Pr.	Tot.	Th.	Pr.	Tot	Th.	Pr.	Tot	Th.	Pr.	Tot		Th.	Pr.	
1	Root Tantra	T+P	5	120	80	200	50	50	100	10	10	20	40	40	80	100	3	3	
2	Explanatory Tantra – I	T+P	6	120	160	280	100	50	150	20	10	30	80	40	120	150	3	3	
3	Quintessential Tantra - I	T+P	7	120	160	280	100	50	150	20	10	30	80	40	120	150	3	3	
4	Last Tantra - I	T+P	7	120	120	240	100	50	150	120	10	30	80	40	120	150	3	3	
5	Environmental Health	T+P	3	90	30	120	50	50	100	10	10	20	40	40	80	100	3	3	
6	Health Education	T+P	3	70	30	100	50	50	100	10	10	20	40	40	80	100	3	3	
7	Health Management	T+P	3	110	30	140	50	50	100	10	10	20	40	40	80	100	3	3	
8	Social studies	T	2	80	-	80	50	-	50	10	-	10	40	-	40	50	1.5	-	
Total			**36**	**830**	**610**	**1440**	**550**	**350**	**900**	**110**	**70**	**180**	**440**	**280**	**720**	**900**			

Certificate in Amchi Medicine (Durra-Pa)

5. Course structure

c) Third year

S.N.	Subjects:	Nature	Hours Distribution				Full Marks			Marks distribution for evaluation/Examination							All Total	Exam Hours	
			Hrs/ week	Hours/year						Internal Evaluation.				External Exam.					
											Practical								
				Th.	Pr.	Tot	Th.	Pr.	Tot	Th.	Exam	Super vision	Tot	Th.	Pr.	Tot.		Th.	Pr
1	Explanatory Tantra – II	T+ P	12.5 for 20 weeks	120	130	250	50	50	100	10	10	-	20	40	40	80	100	3	3
2	Quintessential Tantra – II	T+ P	12.5 for 20 weeks	120	130	250	50	50	100	10	10	-	20	40	40	80	100	3	3
3	Last Tantra - II	T+ P	7 for 20 weeks	50	90	140	50	50	100	10	10	-	20	40	40	80	100	3	3
4	Comprehensive clinical practice	P	48 for 12 weeks	-	576	576	-	300	300	-	100	100*	200	-	100	100	300	3	3
5	Comprehensive community field practice. a) Six weeks in community setting. b) Six weeks in HP/PCH attendance.	P	48 for 12 weeks	-	576	576	-	300	300	-	100	100*	200	-	100	100	300	3	3
Total			32 - 48	290	1502	1792	150	750	900	30	230	200	460	120	320	440	900		

* Marks distribution for internal supervision on Comprehensive Practices:

Components of internal supervision			Marks distribution	
			Clinical practice	Community field practice.
a) Evaluation by	1	Supervising faculty	50	50
	2	Faculty staff	20	20
b) Students performance on	1	Written community report	-	15
	2	Community presentation	-	15
	3	Written care studies	30	-
Total			100	100

6. Target group: All the individual interested in Amchi medicine fulfilling the entry criteria.

7. Group size: Maximum of 40.

8. Duration: Three years

9. Medium of instruction: Tibati (Lama) and/or English and/or Nepali language.

10. Pattern of attendance:

At least 80% attendance in the theory classes and 90% attendance in the practical classes to be eligible for the internal and external examinations.

11. Focus: The focus of curriculum will be on performance /skills / competencies**.**

12. Entry criteria:

- Minimum of second division (50%) in School Leaving Certificate (SLC) (or equivalent) with English, Science and Math as the main subjects.

  OR

  Minimum of 67.5% in Kangjen-Pa (or equivalent) with SLC or equivalent

  OR

  Minimum of first division in Kangjen-Pa with one year of work experience in the related field.
- Entrance examination: written and oral.
- Preferred to the poors, underprivileged and women.

13. Career Path:

Students who have got the certificate of the Durra-Pa (Certificate in Amchi medicine) will be eligible to sit in the entrance examination for Kachu-Pa (Bachelors degree in Amchi Medicine).

14. Follow up suggestion:

- First follow up: One year after the completion of the program.
- Second follow up: Six months after the first follow up.
- Third follow up: Six months after the second follow up.

15. Suggestion for curriculum revision:

curriculum development being a continuous and regular process, especially in the field of science and technology, it becomes even more important because of the emergence of new concepts and skills. So as to meet the demands of emerging skills in the job market it is suggested to revise and include emerging concepts and skills in the curriculum as per the need. The technical inputs for the revision may be collected from the following sources:

- Instructors/technical staff of related institutes in the related area.
- Ex-students of the related institutes in the related areas.
- Government, NGOs and private employers of the related technicians.
- College, universities and training institutes in the related areas.
- Researchers in the related area.
- Experts in the related area at the local and national level etc.

16. Certificate requirement:

CTEVT will provide the certificate of "Certificate in Amchi science (Durra-Pa) to those students who pass all the subjects included in this curriculum. The certificate will be equivalent to the non-gazetted first class technician in Amchi medicine (Amchi health assistant).

17. Trainers' qualification:

1. At least having Master's Degree in Amchi medicine. OR Kachu-Pa with at least one year job experience. OR experienced Amchi having at least twelve years of work experience.
2. Sound communicative/instructional skills.

18. Suggestions for Trainers:

a) Teaching strategies:

Various teaching strategies including the followings are suggested to make the teaching and learning activities innovative, scientific and most effective.

- Lesson
- Games
- Practical
- Simulation
- Role play
- Drama
- Visits
- Demonstrations
- Project method
- Discovery method
- Trainee presentation etc
- Discussion/class room discussions
- Discussions with Amchies
- Class room experiences/exercises
- Field experience/practice
- Field/home visits
- Visiting speakers
- Guest speakers
- Case studies
- Practical applications
- Laboratory practices

b) Suggestion for instruction:

I. <u>The trainers are suggested to develop and adopt the followings for the delivery of knowledge skills (Theory)</u>

- Yearly teaching plan
- Monthly teaching plan
- Weekly teaching plan
- Daily lesson plan
- Students' evaluation scheme and tools.

II. <u>The trainers are suggested to develop and adopt the following for skill training</u>

1. Perform task/skill analysis
2. Develop task analysis product for each task containing
   - Task steps
   - TPO: with given, task, standard
   - Related technical knowledge
   - Time to complete the task
3. Develop check list for each tasks with
   - Check items
   - Performance result decision
   - Marks for each item
4. Perform continuous evaluation for the trainees on the basis of the checklists developed.

III. <u>Trainers are expected to train the trainees in the following sequence regarding practical/task/skill training.</u>

- Slow demonstration of skill/task by the trainers to the trainees as per the sequence of task steps developed during task analysis.
- Demonstration of the skill/task by the trainer in normal speed.
- Each trainee should get an opportunity to practise the demonstrated skills under the supervision of the trainer (Two or three times till they become competent in the given task/skill).
- Each trainee should get opportunity to practise skill/task independently with confidence (No need of supervision in the stage).

19. Grading system:

Distinction: Passed with 80% or above

First division: Passed with 75% or above
Second division: Passed with 60% or above
Third division: Passed with 60% below

20. Students' evaluation details:

1. Regular evaluation of the trainees' performance is to be done by the related instructors to ensure the proficiency over each task/skill in each subject.
2. Theoretical knowledge learnt by the trainees is to be evaluated through written tests.
3. The ratio between internal : external examination will be 20 : 80 (%).
4. Students must achieve a minimum of 40% accuracy in theory and 60% accuracy in practical.
5. There will be three internal assessments and one final examination for each subject.
6. Internal assessment is to be conducted by the related training institute itself while the final examination is totally controlled by CTEVT. The ratio between internal : external examination will be 20 : 80 (%).
7. Entrance examination will be controlled by CTEVT.
8. The certificate will be awarded by CTEVT only after the completion of the comprehensive clinical and field practices.
9. Evaluation of comprehensive practices
   a) Comprehensive clinical practice
      ∗ Internal supervision:

• Evaluation by supervising faculty	50 marks
• Evaluation by faculty staff	20 marks
• Written case studies	30 marks
Total for internal supervision	100 marks
∗ Internal examination	100 marks
∗ External examination	100 marks
Total	300 marks

   b) Comprehensive community field practice:
      ∗ Internal supervision:

• Evaluation of supervising faculty	50 marks.
• Evaluation by faculty staff	20 marks.
• Community report grade	15 marks.
• Community presentation	15 marks.
Total for internal supervision:	100 marks
∗ Internal examination	100 marks
∗ External examination	100 marks
Total:	300 marks

10. Other Evaluation details is to be followed as decided by the examination division of CTEVT.

21. Trainer : Trainees ratio:

- 1 : 10 for technical subjects
- For general subjects (Theory) it varies as per the nature of subject.

22. Facilities:

- Buildings- sufficient for the program.
- Well furnished sufficient class rooms.
- Well furnished staff rooms.
- Well equipped laboratories/clinic.
- Medicinal store.
- Sufficient land for the cultivation of medicinal plants.
- Well equipped and managed Amchi hospital/health post available to use.
- Well equipped library with sufficient text books, reference books and reading materials related to Amchi medicine.
- Hostel (Optional).
- Vehicle (If can be used)
- Sufficient technical staff based on subjects to be instructed.

23. List of instrument:

1. Different types of probes
2. Fork
3. Hollow tube-different types
4. Surgical blade
5. Forceps- different types
6. Fine tweezers
7. Lancet- different types with covers
8. Knife/surgical knife
9. Scapula
10. Stylets- various types
11. Adze- various types
12. Saw-various types
13. Surgical instrument
14. Catheter instrument
15. Cannula/ Annal cannula
16. Cupping horn
17. Fire-cupping bowls.
18. Inhalers
19. Razor
20. Moxibustion instrument-different types
21. Pointed surgical needle
22. Medicinal/measuring spoon
23. Iron file
24. Medicinal file
25. Eye dropper
26. Eye presser
27. Tongue presser
28. Four holed instrument cum flatiron
29. Measuring container
30. Medicinal sieve
31. Medicinal brushes
32. Golden/iron/copper hammers
33. First-aid box

34. White container/bowls
35. Stirring stick etc.

24. Subjects:

a) First year:

1. English (*Same as P.C. Health Science, First year)*
2. Nepali (*Same as P.C. Health Science, First year)*
3. Anatomy and Physiology (*Same as P.C. Health Science, First year)*
4. Botany (*Same as P.C. Health Science, First year)*
5. Zoology (*Same as P.C. Health Science, First year)*
6. Chemistry (*Same as P.C. Health Science, First year)*
7. Physics (*Same as P.C. Health Science, First year)*
8. Mathematics, statistics and computer skills (*Same as P.C. Health Science, First year)*
9. Himali (Lama) language

1. Subject : English

Hours: **120**
Assessment Marks: **100**

Course Description

This is an integrated general English course which treats English as a medium for communication and as a means to knowledge. It provides a remedial refresher course including basic English structures and use of a dictionary, tools for receiving and imparting information effectively, and exposure to poems, essays and stories which are interesting and informative topics of global interest. This course provides a bridge between secondary and university English.

Course Objectives

On completion of the course student will be able to:

Demonstrate skill in the use of English for academic and communicative purposes.
Demonstrate functional, notional and grammatical skill in English language usage.
Explain the relationships between structures and meanings.
Use **English structures in informal communication.**

Minimum Standards

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended texts

Doff, A. et al. Meanings into Words.
Sajhaprakashan, Link English.
The Magic of Words (collection of poetry, essays, prose)

Course : English	Hrs. theory 100
Units: 1-24	Hrs. theory 100
Objectives:	Content:
Describe and ask about places: say where things are describe and ask about available services describe and ask about amenities in town Discuss how to do or not do things: come to a decision with somebody else talk about intentions and plans talk about definite arrangements Describe people's jobs talk about daily routine talk and ask about regular events Give directions	Grammatical structures: there is/are and has/has gotten location prepositions: in, at, above, etc. have something done ("you can have your car washed at that garage") "non-definite" relative clauses ("there are night clubs which tend to be rather expensive") vocabulary about buildings, rooms and furniture Grammatical structures: "are" and "I think I'll…" "I don't think I will..." "I'm going to…" "I'm not going to…" Compound noun phrases, used while talking about jobs

say in what direction people and things move give instructions for making and doing things give street directions Relate and ask about past events say when events happened tell the history of people and places Relate and ask about present events talk about what is happening at the present moment talk about long term changes in progress talk about current activities Relate and ask about doing or not doing things ask people to do and not do things ask permission to do things offer to do things and let people do things report requests and offers Relate about past actions talk about recent past actions and their present results talk about recent activities and achievements Apply the structures for making comparisons using adjectives Apply the structures "using…used to" Use nound and gerunds to discuss degrees of enjoyment Use structures for describing events and circumstances that happened in the past Revise structures from the above lessons: numbers 3, 9 & 11 Use basic structures for giving advice Revise structures from lesson 10 above Apply the prepositions "in," "on" and	"he is a bus driver" Prepositions of direction Sequence expressions "later…..after that,…after…" Present continuous tense and its different uses Structures related to taking actions: making requests negative requests requests for permission reporting requests and responses offers and offers of permission reporting offers Structures for have + past participle Structures using adjectives for making a comparison adjective + er + than more + adjective + than not as + adjective + as "Didn't use to do" and "used not to do" Use of nouns and gerunds (verbal noun with "ing") dancing, walking, etc. Structures for past simple ("a year later he…" "after that he…") past simple + before/when/while past simple passive ("the house was built") Structures are: do you + activity + at all? I + activity + a lot/quite a lot I + activity + much/very much/at all Structures for giving advice You ought to/if I were you I would…. You should….

"at" in different contexts	You'd better… Why don't you…
	Structure revisions for "using..used to"
Apply language used for discussing similar actions, activities and decisions	Prepositions used with "a lake" as illustration there are fish in the lake there are islands in the lake there are people at the lake the boat in on the lake there is a town on the lake
Use structures for giving orders (obligation), for giving permission and for talking about obligation and permission	Structures relating abilities I can…/so can I I can too….I never Nor do I…I don't either; I'm not… Neither am I… I'm not….. either
Demonstrate language for predicting the future.	Structures for giving orders Must, mustn't Can….needn't …can't Have to….don't have to… Weren't allowed to
Describe objects (saying what they are like) and define objects (saying what kind of object they are).	Structures presented are: certainly, definitely, probably, may/might/could.
Demonstrate the use of: too much + noun, too + adjective, and not + adjective + enough.	Objects are described and defined using noun + noun (alarm clock); adjective + noun (racing cars)
	Structures for excesses too much + noun (I have too much work to do) too + adjective (this work is too hard) too many + noun (I have too many books to read) too + adjective + enough (this work is not easy enough)
Describe the background situation in which an event or action takes place. Use structures for making criticisms. Use language required for giving explanations about the past and the present.	Structures for indicating past or future events Structures for criticisms: there should be + noun phrase there shouldn't be + noun phrase should be + verb + ing shouldn't be + verb + ing Structures for explanations: because, in order to, one of the reasons why is….make…lead to…cause…is caused + by
Evaluation methods: written exams, performance observation in simulated settings.	Teaching / Learning activities & resources: text book self study, classroom instruction and practice.

2. Subject: Nepali

नेपाली

तह : प्रमाणपत्र

यो पाठ्यांश प्रवीणता प्रमाणपत्र तहमा अध्ययन गर्ने विद्यार्थीहरुका लागि नेपाली भाषाको व्याकरणात्मक ज्ञान र सुझको विकासका साथै पठनवोध र अभिव्यक्ति क्षमताको विकास गर्ने दृष्टिले राखिएको हो । यसलाई मुख्यत: दुई खण्डमा बाँडिएको छ : व्याकरण खण्ड र बोध-अभिव्यक्ति खण्ड । व्याकरण अन्तरगत वर्ण, वर्ण विन्यास, शव्दवर्ग, रुपायन, शव्द निर्माण र वाक्यसम्बन्धी पाठ्यवस्तुहरु राखिएका छन् भने वोध-अभिव्यक्तिअन्तरगत सामन्यवोध र प्रयोजनपरक वोधका साथै अभिव्यक्ति रचनाका लागि अपेक्षित सीपहरु र समीक्षाका लागि साहित्यिक विधाका पाठहरु समाविष्ट छन् ।

पाठ्यांशको उद्देश्य:

यो पाठ्यांश पूरा गरेपछि विद्यार्थीहरु निम्नलिखित कुरामा सक्षम हुनेछन् :

१. कथ्य भाषा र लेख्य भाषाका बीचको भिन्नता पहिल्याउन ।
२. अभिव्यक्तिमा प्रयोग हुने शब्दहरुको उपयुक्त वर्णविन्यास लेख्न ।
३. शब्दहरुको वर्ग-पहिचान गर्न, रुपायन गर्न र निर्माण गर्न ।
४. वाक्यतत्व र वाक्यन्तरणका कडीहरु बुझेर आफ्ना अभिव्यक्तिमा तिनको उपयुक्त प्रयोग गर्न ।
५. खास वाक्यतत्वसंग सम्बद्ध ढांचा र सन्दर्भका आधारमा अनुच्छेद रचना गर्न ।
६. स्तर अनुरुप पाठ्यसामग्रीमा प्रयुक्त शब्दहरुका आधारमा शब्दभण्डारको विस्तार गर्न ।
७. बोध र संक्षेपीकरणका पाठ्यसामग्रीमा प्रयुक्त शब्दहरुका आधारमा शब्दभण्डारको विस्तार गर्न ।
८. ज्ञान-विज्ञानका विभिन्न शीर्षकहरुमा स्वतन्त्र रुपमा अनुच्छेद र निबन्ध रचना गर्न ।
९. तोकिएका आधारमा साहित्यिक कृतिहरुको समीक्षा गर्न ।

पाठ्यांश सङ्केत: Nepali -I — पूर्णाङ्क : ५०

वर्ष : प्रथम — पाठघण्टा :६०

खण्ड : **नेपाली व्याकरण**

एकाइ	पाठ्य विषयको विवरण	पाठघण्टा	अङ्क
१.	**वर्ण र वर्णविन्यास :**	**८**	**८**
	(क) <u>उच्चार्य वर्णहरुको परिचय</u> :	४	४
	स्वर र व्यञ्जन वर्णहरु		
	देवनागरी लिपि र उच्चार्य नेपाली वर्णहरु		
	नेपाली अक्षरहरुको संरचना		
	(ख) वर्ण विन्यास :	४	४
	कथ्य र लेख्य नेपाली भाषामा भिन्नता		
	ह्रस्व-दीर्घ (इ, उ), स/श/ष, ब/व, व/ओ, य/ए, ऋ/रि, क्ष/छे, क्ष्य/छ्य, शिरविन्दु र चन्द्रविन्दु, हलन्त, पदयोग र पदवियोग तथा लेख्य-चिन्ह		
२.	सम्बन्धी अशुद्धि-संशोधन अभ्यास	१९	१९

	शब्दवर्ग, शब्दरुपायन र शब्द-निर्माण (क) शब्दवर्ग-नाम, सर्वनाम विशेषण, क्रियापद, नामयोगी क्रियायोगी, संयोजक, विस्मयादिवोधक र निपातहरुको पहिचान- अभ्यास (ख) शब्दरुपायन-नाम, सर्वनाम र विशेषणको लिङ्ग, वचन, आदर, कारकका आधारमा तथा क्रियापदको लिङ्ग, वचन, पुरुष, आदर, काल, पक्ष, भाव, वाच्य र अकरणका आधारमा शब्दरुपायनको अभ्यास ।	४ ४	४ ४

एकाइ	पाठ्य विषयको विवरण	पाठघण्टा	अङ्क
	(ग) शब्द निर्माण अभ्यास निम्नलिखित उपसर्गहरुद्वारा शब्दनिर्माणको अभ्यास प्र, अप, सम्, अनु, वि, अधि, उत्, प्रति, परि, उप, सु, नि, निर, दुर् । अ, अन, कु । निम्नलिखित कृत् प्रत्ययद्वारा शब्दनिर्माणको अभ्यास : आइ, ओट, ओ, आउ, आहा, अक्कड, उवा, इलो । अक, अन ई इत, य, तव्य । निम्नलिखित तद्धित प्रत्ययहरुद्वारा शब्दनिर्माणको अभ्यास : आइ, आली, इया, इलो, ई, ए, एली, ली, ले । इक, ई, ईय, इत, ता, त्व, मान, वान, आलु । समस्त शब्दहरुको पहिचान र तत्पुरुष, कर्मधारण, द्विगु, द्वन्द्व, अव्ययीभाव, र वहुब्रीहिको प्रक्रियाबाट समस्त शब्दहरुको निर्माण गर्ने अभ्यास पूर्ण, आंशिक र अपरिवर्तित द्वित्व-प्रक्रियावाट शब्दनिर्माणको अभ्यास **चिकित्सा, शल्य चिकित्सा तथा स्वास्थ्य विज्ञान सम्बन्धी प्राविधिक शब्दहरुको ज्ञान अभ्यास (अर्थ लेख्ने र अर्थ खुल्ने गरी वाक्यमा प्रयोग गर्ने)** इन्द्रलुप्त, उत्क्लेस, ज्वर, पाण्डुरोग, प्रमेह, मधुमेह, पित्तदोस, प्रदर (१. रक्तपदर, २. स्वेतप्रदर) क्षयरोग, नशच्छेदन, रक्तचाप, उच्च रक्तचाप, न्यून रक्तचाप, गर्भपात-पतन, हृदयरोग, पाचनक्रिया, पित्तविकार, रक्तविकार, चिकित्सा, निदान, परिचारिका, प्रसववेदना, प्रसुति, औषधालय, चिरफार, बहिरंग, हिक्का, हरिताल पार्नु, हरिनाश, हियो उठ्नु, वातज्वर, सिफर पल्टिनु, सिङ्गारु, सेपाउनु, सप्को गर्नु, सन्निपात, सभिपात, शल्य चिकित्सा, शूल, शल्योपचार, मासु फरफराउनु, माथा	२ २ २ २ ३ २ **७**	२ २ २ २ ३ २ **५**
३.			

४.	विग्रनु, माटे, माई, भुंग्रेज्वरो, बेर्नु निस्कनु, बालतोड, बाथ, बान लाग्नु, बाउँडिनु, बहलाग्नु, बमन, विरेचन, फुस्रिनु, फुलो पर्नु, फाकफुक, पौंठा बस्नु, पेट बटारिनु, पेट काट्नु, पेट पोल्नु, पिनाश, पाछ्नु, निसलोठ, धम्की, दोख, दमै खटिरो, दम, डकार्नु, ठेउला, झुसिलो डकार आउनु, झिजो मान्नु, झाडा, जिरिङ्ग गर्नु, जल गडा, जनै खटिरा, जगाउनु, छोप्नु, छेर्नु, चिलचिलाउनु, चिप्रा बस्नु, चस्का पर्नु, घमौरा, गला लाग्नु, गलगण्ड, गलफुलो (हाँडे), गोला चल्नु, गानो चल्नु, खरापानी लाग्नु, कण्डू, कुण्ठ, कोर, कोख, कैंठिनु, कुंजो, कांसो लाग्नु, कास, काम्नु, कामज्वर, कांडो, कांध लाग्नु, काई लाग्नु, कब्जियत, औसनी लाग्नु, औडाहा चल्नु, ओछ्यान पर्नु, ओखत मुलो, ओइलाउनु, ऐंठन, उभर्को लाग्नु, उदररोग, उपर्तली, उकुच पल्टनु, अर्बुद, अजीर्ण, अपस्मार, आन्द्रा बटार्नु, आंत, आँठी गांठी, आँठे, आङ् चल्नु, आक्तो, आउं, अरुची, अम्मल, अमल पित्त, अमन हुनु, अग्नी जाग्नु, अतिसार, अँधो खटिरा, स्वेदन । **बाक्यतत्व, वाक्यान्तरण र अनुच्छेद-रचना** (क) वाक्यत्तत्व : लिङ्ग, वचन, पुरुष र आदरका आधारमा कर्ता र क्रियापदका बीचको सङ्गति सम्बन्धी अभ्यास विशेष्य-विशेषण र नाम-सर्वनामको बीचको सङ्गति सम्बन्धी अभ्यास विभक्ति-नियम तथा ले, लाई, देखि, बाट, द्वारा, को, का, की, रो, रा, री, नो, ना, नी, मा आदि विभक्ति प्रयोगको अभ्यास सरल र तिर्यक् विभक्तिनियमको अभ्यास (ख) वाक्यान्तरण : १) विभिन्न काल, पक्ष, भाव, अकरण, वाच्य, प्रेरणार्थक आदिमा वाक्यान्तरण गर्ने अभ्यास २) वाक्य-सश्लेषण र विश्लेषणको अभ्यास (ग) अनुच्छेद-रचना लिङ्ग, वचन, पुरुष आदर, काल, पक्ष, भाव, अकरण, वाच्य, प्रेरणार्थक आदिका आधारमा खास सन्दर्भ वा विषय भित्र रही निम्नलिखित दुई किसिमको अनुच्छेद रचना गर्ने अभ्यास : निर्दिष्ट वाक्य-ढांचामा आधरित अनुच्छेदहरुलाई अन्य ढांचामा परिवर्तन गरी अनुच्छेद रचना गर्ने अभ्यास खास वाक्यत्तत्व संग सम्बद्ध सन्दर्भ वा विषयमा आधारित भएर अनुच्छेदहरु लेख्ने अभ्यास	**२६** १२ ६ ८	**१८** ८ ५ ५

द्रष्टव्य :

२० प्रतिशत अङ्क आन्तरिक मूल्याङ्कनका लागि छुट्याइएको छ ।
यो पाठ्यांशको शिक्षणमा एउटा कक्षाको विद्यार्थी संख्या ४० मात्र हुनेछ ।

सहायक पुस्तकहरु (सम्बद्ध अंश मात्र) :

मोहनराज शर्मा, शब्दरचना र वर्ण(विन्यास वाक्यत्तत्व र अभिव्यक्ति, काठमाण्डौ बुक सेन्टर, काठमाण्डौ ।

चित्र कुमार गुरुङ्ग एम्.एस्सी.र केदार न्यौपाने एम्.ए., प्राविधिक शव्दार्थावली (चिकित्सा तथा विज्ञान खण्ड), त्रिभुवन विश्वविद्यालय, चिकित्सा शाश्त्र अध्ययन संस्थान, अनुसन्धान शाखा, महाराजगंज, काठमाण्डौ ।

हेमाङ्गराज अधिकारी, समसामयिक नेपाली व्याकरण, विद्यार्थी पुस्तक भण्डार, भोटाहिटी, काठमाण्डौ ।

त्रि.वि. पाठ्यक्रम विकास केन्द्र, अनिवार्य नेपाली शिक्षण निर्देशन, काठमाण्डौ ।

लालानाथ सुवेदी र डा.हरि प्रसाद पराजुली, नेपाली वर्णविन्यास, साझा प्रकाशन, ललितपुर ।

लालानाथ सुवेदी, अनिवार्य नेपाली अभ्यास पुस्तिका, टङ्कित सामग्री ।

पाठ्यांश सङ्केत : Nepali –II
वर्ष : प्रथम
खण्ड : **बोध तथा अभिव्यक्ति**

पूर्णाङ्क : ५०
पाठघण्टा : ६०

एकाइ	पाठ्य विषयको विवरण	पाठघण्टा	अङ्क
१.	**बोध र शव्दभण्डार** गद्यांशहरुको बोध र शव्दभण्डारको अभ्यास	१२	१०
२.	**संक्षेपीकरण :** बुंदा टिपोट गरी संक्षेपीकरण गर्ने अभ्यास	४	५
३.	**अनुच्छेद लेखन** ज्ञान विज्ञान र प्रविधिसंग सम्बन्धित विभिन्न विषय शीर्षकहरुमा अनुच्छेद लेख्ने अभ्यास	६	५
४.	**निवन्ध लेखन :** निवन्ध योजना र सो संग सम्बन्धित बुंदा अनुरुप अनुच्छेद गठनको अभ्यास वस्तुपरक र भावपरक निवन्ध लेखनको अभ्यास	८	१०
५.	**कृति समीक्षा :** विषयवस्तु, कथानक, पात्र, परिवेश, सन्देश, शीर्षक र भाषा शैलीका आधारमा निम्नलिखित रचनाहरुको समीक्षात्मक अभ्यास:	३०	२०

	कथा : गुरु प्रसाद मैनाली विश्वेश्वरप्रसाद कोइराला भवानी भिक्षु इन्द्रबहादुर राई रमेश विकल निवन्ध : लक्ष्मी प्रसाद देवकोटा श्यामप्रसाद शर्मा भैरव अर्याल कविता : लेखनाथ पौडेल लक्ष्मीप्रसाद देवकोटा गोपाल प्रसाद रिमाल माधव प्रसाद घिमिरे भूपि शेरचन नाटक : बालकृष्ण सम विजय मल्ल सपना	छिमेकी सिपाही हारजीत रातभरि हरी चल्यो मधुमालतीको कथा वीरहरु आइमाई साथी महापुरुषको संगत नैतिकदृष्टान्त वन परिवर्तन यहि हो मेरो मिथिला मेरो देश रणदुल्लभ बहुला काजीको		

<u>द्रष्टव्य :</u>

२० प्रतिशत अंक आन्तरिक मूल्यांकनका लागि छुट्याइएको छ ।

यो पाठ्यांशको शिक्षणमा एउटा कक्षाको विद्यार्थी संख्या ४० मात्र हुनेछ ।

<u>पाठ्यपुस्तक तथा सहायक पुस्तकहरु</u> :

१ मोहनराज शर्मा, <u>शव्दरचना र वर्ण विन्यास वाक्यतत्व र अभिव्यक्ति</u>, काठमाण्डौ बुक सेन्टर, काठमाण्डौ।

२ त्रि.वि. पाठ्यक्रम विकास केन्द्र, <u>अनिवार्य नेपाली शिक्षण निर्देशन</u>, काठमाण्डौ ।

३ कृष्ण प्रसाद पराजुली, <u>नेपाली अध्ययन तथा अभिव्यक्ति</u>, रत्न पुस्तक भण्डार, काठमाण्डौ ।

४ लाला नाथ सुवेदी, <u>अनिवार्य नेपाली अभ्यास पुस्तिका</u>, टंकित सामाग्री ।

५ गोरखा पत्र, कान्तिपुर आदि पत्रिकाका सम्पादकीय, टिप्पणी र लेखहरु ।

3. Subject: Anatomy and Physiology

Hours Theory: **120**
Hours Lab: **60**
Assessment Marks: **100**

Course description

This course provides basic knowledge of the normal structure and function of the systems of the human body. The content prepares the student to understand the pathology and clinical features of medical and surgical conditions, diseases and disorders, as well as the rationale for treatments and management.

Objectives

On completion of this course the student will be able to:

Identify the classifications of the systems of the human body.
Locate and describe the structure and function of the components of each body system.
Explain the interrelationship of the body systems.
Transfer knowledge of anatomy and physiology of the body to medical and surgical circumstances.
Explain the mechanisms of body repair and resistance to disease.
Describe the physical changes that occur during normal growth and development, from conception to senescence.

Minimum Standards

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended Text

Ross & Wilson, Anatomy and Physiology. Churchill Livingstone, London. Current edition.

Reference Texts

Shier, D., Butler, J. & Lewis, R., Hole's Human Anatomy and Physiology. Wm. C. Brown Publishers, London. 1996 or current edition.
Chauarasia, Handbook of Human Anatomy. CBS Publication. Current edition.

Course: Anatomy and Physiology	Hrs. theory 120 Hrs. tutorial 60
Unit: 1 Introduction of Anatomy and Physiology	Hrs. theory 3 Hrs. tutorial 1
Objectives:	Content:
Define anatomy and physiology; explain how they are related. List and describe the chief characteristics of life and the chief requirements of living organisms. Define homeostasis and discuss its importance for survival. Describe the locations of each main body cavity and list the organs within each cavity. Name the organ systems, tell the function of each system, and list the organs associated with each system. Define the terms that describe body positions, body sections, and body regions. Review the general characteristics of cell structure,	Concepts of anatomy and physiology: the homeostatic, integrated, self-healing nature of body cells and tissues. Organization of the human body. Review of cellular and tissue characteristics, functions. Anatomical terms: Cardiovascular Digestion Excretion Organ Peritoneal Pericardial

function, and reproduction. Describe the general characteristics and functions of the body tissues: epithelial, cartilage, connective, bone, nerve, adipose and three kinds of muscle tissue. Q: If a patient complained of a pain in the umbilical region, what organs located in this region might be the cause of he pain?	Physiology Thoracic Visceral
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	Hrs. theory 114 Hrs. tutorial 56
Sub-unit: Skin & integumentary	Hrs. theory 6 Hrs. tutorial 3
Objectives:	Content:
Describe the four chief types of membranes. Describe the structure of the various layers of the skin. Describe the function of each layer of skin. Describe the location and function of the accessory organs located within the layers of skin. Explain how the skin regulates body temperature. Summarize the factors that determine skin color. Q: A premature infant lacks adipose tissue, and the surface area of his skin is great compared to body mass. How does this effect regulation of body temperature?	Types of membranes. Layers of the skin. Accessory organs and glands of the skin. Thermoregulatory function of the skin. Pigmentation. Healing of wounds, burns; skin disorders.
Evauation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Skeletal system	Hrs. theory 5 Hrs. tutorial 4
Objectives:	Content:
Describe the chief functions of bones. Classify bones according to their shape and give an example from each group. Describe the structure of a bone and tell the function of each part. Differentiate between intramembranous and endochondral bones and tell how each type of bone grows and develops. Discuss the effects of hormones, sunlight, and exercise on bone development. Differentiate between axial and appendicular skeletons and name the major bones of each system. Locate and identify the bones that comprise the skull, vertebral column, thoracic cage, pectoral girdle, upper limb, pelvic girdle, and lower limb. Locate and identify the features of these bones.	Functions of bone: support/protection body movement blood cell formation Structure of bone. Bone growth and development. Factors affecting growth and repair. Skeletal organization. Terms related to the skeletal system: axial appendicular articular cartigage diaphysis epiphysis fontanel

Q: Why do some elderly people develop bowed backs and become shorter than their earlier years, while other elderly people do not?	hematopoiesis marrow periosteum
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Skeletal joints	Hrs. theory 5 Hrs. tutorial 4
Obectives:	Content:
Describe how joints can be classified according to the type of tissue that holds them together. Describe how bones are held together in fibrous joints and cartilaginous joints. Describe the structure of a synovial joint. List six types of synovial joints and give an example of each type. Explain how skeletal muscles produce movements at joints and give examples of different kinds of movement. Describe these joints and explain how the articulation parts are held together: shoulder elbow hip knee ankle wrist others Question: What is the function of the fontanels?	Classifications of joints: fibrous, cartilaginous, synovial. Types of joint movement. Structure and types of synovial joints. Terms related to joints: articulation bursa ligament suture symphysis synovial
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Muscle system	Hrs. theory 10 Hrs. tutorial 3
Objectives:	Content:
Name the chief parts of a skeletal muscle fiber and describe the function of each part. Describe the process of muscle contraction. Describe the supply of energy to a muscle and the condition of muscle fatigue. Differentiate between fast and slow muscles and between twitch and sustained contraction. Explain how muscle contractions produce body movement and maintain posture. Distinguish between the structures and functions of skeletal, cardiac and smooth muscles. Identify and describe the locations of the chief skeletal muscles and describe the action of each.	Structure of a skeletal muscle: connective tissue coverings skeletal muscle fibers neuromuscular junction motor units Skeletal muscle contraction: role of myosi and actin stimulus for contraction muscular responses Smooth muscle fibers and contraction. Cardiac muscle fibers and contraction. Actions of the muscles of the skeletal system: Terms related to the muscular system:

muscles of facial expression & mastication muscles that move the: head pectoral girdle arm forearm hand abdominal wall pelvic outlet thigh leg foot Q: Following childbirth, a woman may lose urinary control when sneezing or coughing. What muscles of the pelvic floor should be strengthened by exercise to help solve this problem?	antagonist fascia insertion motor neuron muscle impulse neurotransmitter origin synergist
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	Hrs. theory Hrs. tutorial
Unit: 2 Systems of the Body	Hrs. theory Hrs. tutorial
Sub-unit: Nervous system	Hrs. theory 5 Hrs. tutorial 3
Objectives:	Content:
Explain the general functions of the nervous system. Describe the structure of a neuron. Describe the events that lead to the conduction of a nerve impulse. Explain how a nerve impulse is transmitted from one neuron to another. Explain how neurons are classified. Describe a reflex arc. Explain what is meant by reflex behavior. Q: What might be deficient in the diet of a pregnant woman who is reporting leg muscle cramps?	Classifications of neurons and neuralgia. cell membrane function. Synapse function. Neurotransmitters and neuropeptides. Impulse processing. Nerve pathways. Reflex function. Terms related to the nervous system: axon central nervous system dendrite effector myelin neuroglia neuron neuroratansmitter receptor reflex synapse
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Components of the nervous system	Hrs. theory 6 Hrs. tutorial 3
Objectives:	Content:

Describe the coverings of the brain and spinal cord. Describe the structure of the spinal cord and its chief functions. Locate the chief parts of the brain and describe the function of each. Locate the motor, sensory, and association areas of the cerebral cortex. Explain the meaning of hemisphere dominance. Describe the stages of memory storage. Describe the formation and storage of cerebrospinal fluid. Describe the functions of the limbic system and reticular formation. Locate the chief components of the peripheral nervous system. Describe the structure of a peripheral nerve. Describe the location and function of each of the cranial and spinal nerves. Compare the functions of the sympathetic and parasympathetic divisions of the autonomic nervous system. Q: A mental health patient is always depressed and anxious. What brain systems are not functioning correctly? Q: What symptoms might the sympathetic division of the nervous system produce in a person who is experiencing stress?	Divisions of the central nervous system: meninges spinal cord brain Structure and function of the cerebrum. Effects of cerebral injury. Ventricles and cerebrospinal fluid Divisions of the peripheral nervous system: cranial nerves spinal nerves Functions of the autonomic nervous system. Terms related to the nervous system: adrenergic brain stem cerebellum cerebral cortex cerebral hemisphere cerebrum cholinergic hypothalamus medulla oblongata meninges midbrain parasympathetic reticular formation sympathetic thalamaus ventricle
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Somatic and special senses	Hrs. theory 6 Hrs. tutorial 3
Objectives:	Content:
Name five kinds of sensory receptors and explain the function of each. Explain how the receptors stimulate sensory impulses. Describe how sensation is produced. Describe how the sense of pain is produced. Locate and name the parts of the ear and explain the function of each part. Differentiate between static and dynamic equilibrium. Name the parts of the eye and explain the functions of each part. Describe the visual nerve pathway.	Functions of receptors and sensations. Function of the somatic senses: touch/pressure, temperature, stretch, pain. Olfactory organs: location and functions. Taste perception. Auditory organs: location, function of parts the middle, inner and external ear. Processes of equilibrium. Function of visual organs: visual accessory organs structure of the eye light refraction visual nerve pathways Terms related to senses: accommodation ampulla chemoreceptor cochlea cornea dynamic/static equilibrium

Q: The auditory tubes of a child are shorter and directed more horizontally than those of an adult. How might this explain the greater prevalence of middle ear infections in children compared to adults? Q: How would a vitamin A deficiency effect the vision of a pregnant woman? A young child?	labyrinth macula optic photoreceptor proprioreceptor referred pain retina sclera thermoreceptor
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2. Systems of the Body	
Sub-unit: Endocrine system	Hrs. theory 6 Hrs. tutorial 3
Objectives:	Content:
Differentiate between endocrine and exocrine glands. Explain how steroid and nonsteroid hormones produce effects on target cells. Discuss how negative feedback mechanisms regulate hormonal secretions. Explain how the nervous system controls hormonal secretions. Name and locate the chief endocrine glands and tell the hormones they secrete. Describe the functions of the hormones secreted by the endocrine glands. Explain how the secretion of each hormone is regulated. Distinguish between physical and psychological stress. Describe the general stress response and its effects on the body when stress is continuous. Q: Bases on the actions of glucagons and insulin, would a person with diabetes be likely to require more insulin or more sugar following strenuous exercise? Q: What problems might result from the prolonged administration of cortisol to a person with an inflammatory disease?	Characteristics f the endocrine system. Functions of hormones. Control of hormone secretion. Structures, functions and locations of endocrine glands: pituitary thyroid parathyroid adrenal pancreas thymus ovary/testes/placenta pineal Terms related to endocrine system: adrenal cortex adrenal medulla aldosterone anterior pituitary epinepherine catacholamine glucagon luteinizing hormone metabolic rate norepinepherine prolactin prostaglandin steroid thyroxine
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2. Systems of the Body	
Sub-unit: Blood	Hrs. theory 6 Hrs. tutorial 3
Objectives:	Content:

Describe the characteristics of the blood and tell the functions of blood. Differentiate between the different types of blood cells. Explain the interpretation of blood cell counts. Describe the production and control of red blood cells. Tell the components of plasma and the function of each . Define homeostasis and describe how it is maintained. Describe the steps in blood coagulation. Discuss factors which increase or interfere with blood coagulation Explain the purpose and process of blood typing. Describe how blood reactions may occur between the fetal and maternal tissues. Q: What factors may contribute to anaemia among persons of lower or higher socioeconomic position in Nepal?	Components and function of the blood. Differential interpretation of blood counts. Role of blood in maintaining homeostasis. Production and regulation of blood cells. Coagulation factors. Blood types and blood reactions. terms related to the study of blood: albumin, antibody, antigen, basophil, embolus, eosinophil, erythrocyte, erythropoeitin, fibrinogen, globulin, hemostasis, leukocyte, lymphocyte, macrophage, monocyte, neutrophil, plasma, platelet, thrombus
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2. Systems of the Body	
Sub-unit: Cardiovascular system	Hrs. theory 6 Hrs. tutorial 4
Objectives:	Content:
Name the organs of the cardiovascular system and describe their functions. Locate and name the major parts of the heart and describe the function of each. Describe the pathway of the blood through the heart and the vessels of the coronary circulation. Describe the cardiac cycle and tell how it is controlled. Compare the structures and functions of the chief blood vessels of the body. Explain the mechanisms that aid in returning venous blood to the heart. Explain how blood pressure is produced and controlled. Compare the pulmonary and systemic pathways of the cardiovascular system. Identify and locate the chief arteries and veins of the pulmonary and systemic circulatory systems.	Structures and functions of the heart. Interpretation of heart sounds. Locations, functions and characteristics of arteries and arterioles. Capillaries and their actions. Locations, functions and characteristics of veins and venules. Regulation of blood pressure. Mechanisms of venous flow. Names, functions and locations of the vascular components of the pulmonary and systemic circulatory systems. Terms related to circulation: arteriole atrium cardiac cycle cardiac output diastolic pressure electrocardiogram myocardium pacemaker pericardium peripheral resistance sphygmomanometer systolic pressure vasoconstriction vasodilation

Q: When cirrhosis of the liver causes restriction of blood flow through the liver, blood backs up and causes capillary distention. What organs are most likely affected, and what are the symptoms? Q: A blood clot in the left femoral vein breaks loose and travels toward the heart. Where is the embolus likely to go, and what symptoms will be seen?	ventricle venule viscosity
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Lymphatic system and immunity	Hrs. theory 6 rs. tutorial 3
Objectives:	Content:
Describe the functions of the lymphatic system and locate the chief lymphatic pathways. Explain how lymphatic circulation is maintained. Locate the chief lymph nodes and describe their functions. Describe the functions of the thymus and spleen. Differentiate between specific and nonspecific immunity and provide examples of each. Describe the function of lymphocytes and immunoglobulins. Differentiate between active and passive immunity. Distinguish between primary and secondary immune responses. Explain how allergic reactions, tissue rejection reactions, and autoimmunity are related to immune mechanisms. Describe the disorders believed to be caused by an autoimmune reaction.. Q: Explain why vaccination provides long-lasting protection against a disease, while gamma globulin provides only short-term protection.	Patterns of Lymphatic movement. Lymph node location, function and structure. Functions of the thymus and spleen. Specific and nonspecific defenses against infection. Immunity and allergic reactions. Disorders with autoimmune origins: Type 1 Diabetes Lupus erythematosus Rheumatoid arthritis Scleroderma Multiple sclerosis Schizophrenia Terms related to lymphatics and immune system: allergen antibody antigen interferon lymphocyte macrophage pathogen vaccine
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Digestive system	Hrs. theory 6 Hrs. tutorial 3
Objectives:	Content:
Locate and describe the functions of the chief organs of the digestive system. Name the parts of the stomach, liver and gall bladder, large and small intestine. Describe the structure of the wall of the alimentary canal. Describe how the contents of the alimentary canal are moves and mixed. List the enzymes the various digestive organs and glands secrete and describe the function of each. Describe how digestive secretions are controlled. Discuss how digestive reflexes control movement of	Structures and functions of the alimentary canal. Movement and enervation f the alimentary canal. Mouth structures and functions. Pharynx and esophagus structure and function. Gastric secretions and absorption. Structure and functions of the pancreas and liver in regard to digestion. Structure and function of the small and large intestines. Terms related to the digestive system: absorption

material through the alimentary canal. Describe the mechanisms of swallowing, vomiting and defecating. Explain how the products of digestion are absorbed. Q: Why may a person with inflammation of the gallbladder (cholecystitis) also develop an inflammation of the pancreas (pancreatitis)?	anal canal bile chyme deciduous duodenum emulsification feces jejunum ilium mesentery mucous membrane panacreatic juice peristalsis pyloric sphinctor rectum sphincter muscle vermiform appendix villi/villus
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Respiratory system	Hrs. theory 6 Hrs. tutorial 4
Objectives:	Content:
Describe the functions of the respiratory system. Locate the organs of the respiratory system and describe the function of each. Explain how inspiration and expiration are achieved. Describe the respiratory cycle and define the related terms: tidal volume, inspiratory reserve, expiratory reserve, residual volume, vital capacity, inspiratory capacity, functional residual capacity, total lung capacity. Locate the respiratory center and explain how it controls normal breathing. Describe the various factors which affect the respiratory center. describe the structure and function of the respiratory membrane. Explain how oxygen and carbon dioxide are transported in the blood. Describe the process of cellular respiration. Explain how cells use oxygen. Q: Persons experiencing an asthma attack are often advised to breathe through pursed (puckered)lips. How might this help reduce the symptoms of asthma?	Organs of the respiratory system. Mechanisms of breathing and control of breathing. Alveolar gas exchanges. Gas transport. Terminology related to respiration: alveolus bronchial tree diaphragm glottis intercostal muscles hilus hyperventilation oxyhemoglobin parietal pleura partial pressure pleural cavity respiratory membrane respiratory volume surface tension surfactant visceral pleura
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Urinary system	Hrs. theory 6 Hrs. tutorial 4
Objectives:	Content:

Locate the organs of the urinary system and tell their general functions. Describe the structure and function of the kidneys. Describe the pathway of blood through the kidneys. Describe a nephron and explain the function of its parts. Explain how glomerular filtrate is produced and state it's components. Discuss the regulation of glomerular filtration and factors that may affect this. Describe tubular reabsorption and tubular secretion, in the production of urine. Describe the structure and function of the ureters, urinary bladder, and urethra. Describe the process of micturation and tell how it is controlled. Q. Inflammation of the urinary bladder is more common in women than in men. How might this be related to the anatomy of the male and female urethras?	Location, structure and function of the organs of the urinary system. Renal circulation. Processes and regulation of urine formation: glomerular filtration tubular reabsorption concentration and volume Formation of urea, ureic acid. Tubular secretion and urine composition. Elimination of urine. Terms related to the urinary system: afferent arteriole autoregulation destusor muscle efferent arteriole glomerulus juxtaglomerular apparatus nephron loop pertibular capillary renal corpuscle renal cortex renal medulla renal plasma threshold renal tubule retroperitoneal
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Water, electrolyte & pH balance	Hrs. theory 5 Hrs. tutorial 3
Objectives:	Content:
Discuss the importance of water and electrolyte balance within the human body. Describe how body fluids are distributed within compartments, how fluid composition differs between compartments, and how fluids move from one compartment to another. List the routes by which water leaves and enters the body. Describe how water intake and output are regulated by the body systems. List the important electrolytes of the body. List the ways electrolytes enter and leave the body; discuss the regulation of these activities. Explain the meaning of acid-base balance within the body. Tell where hydrogen ions come from within the body. Describe the action of the body's chemical buffer systems, respiratory center, and the kidneys in regulating acid-base balance. Q: What happens to the fluid and electrolyte balance when a person is severely burned over much of the body? What measures will help protect the patient?	Composition of body fluids. Distribution and movement of fluids between compartments. Mechanisms of water balance and regulation. Mechanisms of electrolyte balance and regulation. Regulation of hydrogen ion concentration. Terms related to water and electrolyte balance: acidosis alkalosis bicarbonate buffer system electrolyte balance extracelllular intracellular osmoreceptor phosphate buffer system protein buffer system transcellular

Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Male reproductive system	Hrs. theory 5 Hrs. tutorial 3
Objectives:	Content:
State the general functions of the male reproductive system. Name the parts of the male reproductive system and describe the general functions of each. Describe the process of spermatogensesis. Describe the path of sperm sells from their origin to their exit from the body. Describe the structure of the penis and explain the mechanism of erection and ejaculation. Explain how hormones control the activities of the m male reproductive organs and the development of male secondary sexual characteristics. Describe how a vasectomy is performed, and discuss the relative simplicity of this procedure. Q: As a male reaches adulthood, what will be the consequences if his testes have remained undescended since birth?	Structure and function of the external organs: penis, testes, scrotum. Formation and release of sperm cells. Internal accessory organs: epididymis, vas deferens, seminal vesicle, prostate gland, bulbourethral glands, Actions of male sex hormones. Terms related to male reproductive system: corpora cavernosa corpus cavernosa gonadotropin inguinal semen spermatogenesis testosterone glans penis prepuce
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 2 Systems of the Body	
Sub-unit: Female reproductive system	Hrs. theory 5 Hrs. tutorial 3
Objectives:	Content:
Name the parts of the female reproductive system and describe the function of each. Describe the process of oogenesis. Describe how the hormones control the activities of the female reproductive system and the development of female secondary sexual characteristics. Describe the process of the menstrual cycle. Describe the hormonal changes that occur in the maternal body during pregnancy. Describe the birth process and explain the role of hormones in this process. Explain why females are more easily infected by sexually transmitted diseases than men, given equal exposure. Q: New mothers sometimes experience cramping in their uterus when they breastfeed their babies. How would you explain this, and how would you advise these mothers? Q: A woman requests a tubal ligation for contraception. She asks if this will cause her menstrual periods to stop. What will you say?	Structure and function of the ovaries, tubes, uterus, vagina, clitoris, labia, breasts and mammary glands. Ova development and ovulation. Hormonal control of the reproductive system. Fertilization and embryonic development. Pregnancy changes. Process of childbirth and physiological recovery. Structure and function of the mammary glands. Terms related to the female reproductive system: estrogen fertilization follicle inplantation infundibulum meiosis menopause menstrual cycle oogenesis

Q: Which birth control methods are most effective in reducing the risk of sexually transmitted diseases?	orgasm ovulation placenta progesterone puberty zygote
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.
Course: Anatomy and Physiology	
Unit: 3 Human Growth & development	Hrs. theory 10 Hrs. tutorial 3
Objectives:	Content:
Distinguish between growth and development. Describe the process of development from conception through the embryonic stage. Describe the formation and function of the placenta. Define the term foetus and describe the foetal stage of development. Describe the path of blood through the foetal circulatory system. Describe the chief circulatory and physiological adjustments that occur in the newborn. List the stages of development that occur between the neonatal period and death, and tell the general characteristics of each stage. Q: What symptoms may appear in a newborn if its ductus arteriosis fails to close?	Embryionic and foetal development. Foetal circulation and neonatal changes. Characteristics of the stages of life development: neonatal infancy childhood adulthood senescence Causes of aging. Terms related to growth and development: amnion chorion embryo foetus neonatal placenta postnatal prenatal umbilical cord zygote
Evaluation methods: written and viva exams.	Teaching / Learning activities and resources: classroom instruction, models, charts.

4. Subject: Botany

Hours Theory: **120**
Hours Practical: **60**
Assessment Marks: **100**

Course Description

This course provides basic knowledge about botany, divided into eight units. The first unit gives general information about botany including different life components. The second unit tells about the structure and functions of a cell and its organelles including the cell reproduction. The third unit discusses the diversity of life, and includes basic information about algal plants, fungal plants, bacteria and viruses. Unit four provides information about life processes of plants such as diffusion, osmosis, photosynthesis, respiration and transpiration. Unit five teaches about heredity and variation. This unit also provides the information about genetic diseases/disorders in humans. Unit six provides information about the factors of our environment, their interrelationships, and effects of pollutants to human health. Unit seven includes information about selected medicinally and nutritionally important plants. Unit eight provides information about biotechnology and genetic engineering.

Course Objectives

At the end of the course, the student will be able to:

Identify the scope of botany and its different branches.
Explain about the life components, cell structures and their functions.
Explain the different physiological processes in a plant body.
Explain the role of genes and their transmission to the progeny.
Describe how environmental factors and pollutants affect our lives.
Identify different members of plant kingdom based on their general characteristics.
Describe the life cycle of selected plant species from algae and fungi.
Identify the economic importance of viruses, bacteria, algae and fungi in the field of medicine.
Describe the application of biotechnology in the field of medical science.

Minimum Standards

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended Texts

Dutta, A.C., Classbook of Botany, Oxford University Press, Calcutta.
Alexopolous, C.J., Introductory Mycology, John Wiley and Sons, New York.
Pandey, B.P., Economic Botany, S. Chand and Company Ltd., New Delhi.
Salisbary and Ross, Plant Physiology.
Medicinal plants of Nepal, HMG of Nepal.
Gangulee, M.C. and Kar, A.K., College Botany Vol. II New Central Book Agency, Calcutta.
Kochhar PL Genetics and Evolution, Ratan Prakashar Mandor, Delhi.
Shah and Sonhas, Cytogenics, Plant Breeding and Evolution, Vikash publishing House Pvt. Ltd. V. P.
Ranjtkar H.D. Laboratory Manual and Viva-voce for Proficiency Certificate Level, AK Ranjitkar, Kathmandu.
Pandey, B.P., Modern Practical Botany Vol. I and II, S Chand and Company Pvt. Ltd., New Delhi.

References Books:

Sharma, O.P. and Agrawal, V.K.S., Cell biology, Genetics, Evolution and Ecology.
Bhattic, K.N. and Khanna, Modern Approach to Botany, Surya Publication, Jalandhar.
Saxena A.L. and Sarabhai, R.P., A Textbook of Botany, Batan Prakashan Mandor.
Bilgrami, K.S., Shrivastava, L.M., and Shremali, J.L., Fundamentals of Botany, Vani Educational Books.
Dey, N.C., and Dey, T.K., Medical Bacteriology, Messers Allied Agency.
Sharma, D.P., Hill's Economic Botany, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
Winchester, A.M., Biology and Its Relation to Mankind 3rd ed.
Singh,V., and Sinha, S., Cytogenetics.
Man Dhar, C. L., Introduction to Plant Virus, S. Chand and Company Ltd., Delhi.

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Course: Botany	Hrs. theory 120 Hrs. lab 60
Unit: 1. Introduction	Hrs. theory 9
Sub-unit: 1.1 Definition, Scope and Different Branches of Botany.	Hrs. theory 2
Objectives:	Content:
Define Biology and Botany Tell why the study of plants is necessary. Explain the difference between living organisms and non-living things. List the importance of plants in every day life.	Definition of biology and botany. Objectives and scope of botany. Importance of plants.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 1. Introduction	
Sub-unit: 1.2 Different Branches of Botany and Their Relationships with Other Science.	Hrs. theory 3
Objectives:	Content:
List the major branches of botany and state the definition of each branch. Discuss how taxonomy is related to morphology, anatomy, embryology, cytology, and genetics. Discuss how evolution is related with paleontology. Discus how phytogeography is related with ecology. Correlate botany with physics, chemistry and statistics. List the branches of botany based on the organisms.	Different branches of botany. Correlation between different branches. Correlation between botany and other sciences.
Evaluation methods: oral and written tests, home	Teaching / Learning activities & resources:

assignments.	classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 1. Introduction	
Sub-unit: 1.3 Life Components.	Hrs. theory 4
Objectives:	Content:
Define the terms cellular pool, macromolecules and micro-molecules. List the basic inorganic molecules of the living system. List the function of minerals. List the basic organic molecules of living system. List the function of carbohydrates, proteins, lipids and nucleic acids. Differentiate the essential amino acids and non-essential amino acids. List the properties of water.	Description of inorganic molecules in living system. i) Water and its properties. ii) Minerals and their functions. Description on the bio-molecules like carbohydrates, proteins, lipids and nucleic acids.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 2. Cell Biology	Hrs. theory 9
Sub-unit: 2.1 Introduction to Cell Biology	Hrs. theory 5
Objectives:	Content:
Explain about the discovery of cell. Define cell as a basic unit of life and a self-contained unit. Describe the concept of cell theory. Differentiate between unicellular and multicellular organisms. Identify distinctions between a plant cell and an animal cell. Identify the flow of energy through the cell. Identify how DNA helps in the flow of information through a cell. Define cell organelles and cell inclusions. List different kinds of cell organelles and cell inclusions. Describe the occurrence, shape and size, number and functions of different types of cell inclusions and cell organelles (of animals): Cytoplasmic contents - mitochondria, endoplasmic reticulum, golgi complex, lysosome, ribosome, micro-bodies and tubules, centriole and centrosome, vacuoles, cilia and flagella. Nucleoplasmic contents - chromatids, nucleolus, nature of nuclear membrane, etc. Differentiate between cytoplasm and nucleoplasm, cristae and cisternae, lysosome and ribosome, microtubules and microfilaments.	Discovery of cell and cell theory. Plant cell and animal cell; their differences. Unicellular and multicellular organisms. Meaning of cell organelles and cell inclusions. Structural and functional study (occurrence, shape and size, number and function) of different types of cytoplasmic and nucleoplasmic contents (with special reference to animals).
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 2. Cell Biology	

Sub-unit: 2.2 Cell Division	Hrs. theory 4
Objectives:	Content:
Define cell cycle, amitosis, mitosis and meiosis. Describe amitosis cell division. Explain the significance of amitosis. Describe the steps of mitotic cell division using a labeled diagram. Explain the significance of mitosis. Describe the steps of meiotic cell division with necessary sketches. Explain why meiosis is called reductional division and is important in sexually reproducing organisms. Explain the significance of meiosis. Distinguish between mitosis and meiosis.	Definition of cell cycle. Amitosis, mitosis and meiosis cell divisions. Differences between mitosis and meiosis cell divisions.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 3 Diversity of life	Hrs. theory 17
Sub-unit: 3.1 Classification of plant kingdom	Hrs. theory 4
Objectives:	Content:
Describe the classification system of plant kingdom into different categories. Describe different taxonomic categories such as species, genus, family, order, class, division, etc. Tell about how a plant can be placed in hierarchic system in classification.	1. Classification of plant kingdom. 2. Binomial nomenclature. 3. Taxonomic categories. 4. Hierarchic system in classification.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 3 Diversity of life	
Sub-unit: 3.2 General characteristics of different plant groups.	Hrs. theory 4
Objectives:	Content:
List the characteristics of algae. List the characteristics of fungi. Differentiate algae from fungi. Differentiate liverworts from moss. List the l differences between pteridophytes and gymnosperms based on morphology. Identify the type of leaves in dicot and monocot plants. Differentiate dicot root from monocot root. Describe the structural differences between a monocot plant and a dicot plant.	The unicellular plant and multicellular plant. The characteristics of algae. General characteristics of bryophytes. Morphological characteristics of pteridophytes. Morphological characteristics of gymnosperms. General characteristics of angiosperms. Differences between monocot and dicot plants.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 3 Diversity of life	
Sub-unit: 3.3 Algae	Hrs. theory 4 Hrs. lab

Objectives:	Content:
Define algae. Differentiate green algae from blue green algae. Classify Spirogyra and Nostoc. Describe about vegetative, asexual and sexual reproduction in Spirogyra. Explain what conjugation is. Describe the life cycle of Spirogyra using a labeled diagram. Describe the medicinal values of different kinds of algal plants. Describe the importance of Nostoc in agriculture.	Structure of Spirogyra and Nostoc. Life cycle of Spirogyra. Medicinal values of algae.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 3 Diversity of life	
Sub-unit: 3.4 Fungi	Hrs. theory 6
Objectives:	Content:
Define fungi. Compare fungal plant with algal plant. Describe the morphology of a typical fungal plant. Identify the hypha and mycelium of a fungus. Describe briefly the different methods of asexual reproduction in Fungi. Tell about the stages of sexual reproduction (i.e. plasmogamy, karyogamy and meiosis). Describe the life cycle of *Mucor*, Yeast, *Aspergillus*, *Penicillium* and *Claviceps purpurea* using a labeled diagram. Distinguish between edible and poisonous mushrooms. List the fungal plants, which are used in antibiotic production. List the fungal plants, which cause diseases in man.	Morphology of a typical fungal plant. Types of reproduction in brief of reproduction in brief: Vegetative Asexual Sexual Life cycle of *Mucor*, Yeast, *Aspergillus, Penicillium* and *Claviceps purpurea.* Differences between edible and poisonous mushroom. Economic importance of fungi especially in the field of human health and medicine.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 3 Diversity of life	
Sub-unit: 3.5 Bacteria	Hrs. theory 6 Hrs. lab 6
Objectives:	Content:
List the characteristics of bacteria. Describe the structure of bacteria. Differentiate Gram positive bacteria from Gram negative bacteria. Describe the types of reproduction in bacteria. Identify the role of vector and plasmid in reproduction. List the environmental factors that influence the growth of bacteria. Define toxin. State Koch's postulate.	Structure and reproduction of bacteria. Differences between gram positive and gram negative bacteria. Factors influencing the growth of bacteria. Koch's postulate. Economic importance of bacteria. beneficial activities harmful activities

List the harmful and beneficial aspects and activities of bacteria.	
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 3 Diversity of life	
Sub-unit: 3.6 Virus	Hrs. theory 7 Hrs. lab 2
Objectives:	Content:
Define virus particles. Describe the nature and chemical composition of viruses. Describe the structure and function of a bacteriophage. Tell about mode of nutrition in viruses. Mention the types of viruses - bacterial virus, DNA virus, RNA virus. Compare plant and animal viruses. Differentiate DNA virus from RNA virus. Tell the effect of retrovirus in man. List the agents responsible for transmission of viruses. Tell about the method of multiplication of viruses. List the economic importance of viruses in the field of human health and medicine.	Definition of virus. Characteristics of a virus. Classification of viruses. Transmission of viruses. Reproduction in viruses: Lytic cycle Lysogenic cycle. Economic importance of viruses.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Oral tests, home assignments, written examination	Class room instruction, Illustrations, Diagrams, Visuals
Minimum Standards: achieve 40% accuracy in theory; 60% in lab	Text books, Reference books
Course: Botany	
Unit: 4 Life Process (Physiology)	Hrs. theory 14 Hrs. lab 10
Sub-unit: 4.1 Diffusion	Hrs. theory 2 Hrs. lab 2
Objectives:	Content:
Define diffusion. Describe the mechanism of diffusion with examples. Tell about the factors that affect diffusion. List the significance of diffusion on plant life and animal body.	Definition and process of diffusion. Factors affecting diffusion. Significance of diffusion.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 4 Life Process (Physiology)	
Sub-unit: 4.2 Osmosis	Hrs. theory 3
Objectives:	Content:
Define osmosis (including endo-and exoosmosis), osmotic pressure and osmotic potential. Tell the meaning of hypertonic and hypotonic solution.	Definition of osmosis. Mechanism of osmosis. Demonstration of osmosis by egg membrane

Tell the meaning of turgid and flaccid cells. Identify the functions of a semi-permeable membrane. Describe osmosis in living cells. List the significance of osmosis. Relate the osmosis with plasmolysis.	method. Demonstration of osmosis by potato-osmoscope. Plasmolysis and deplasmolysis. Significance of osmosis.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 4 Life Process (Physiology)	
Sub-unit: 4.3 Transpiration	Hrs. theory 3
Objectives:	Content:
Define transpiration. List the parts of a plant that are involved in transpiration. Describe the mechanism of transpiration in plants. Name the types of transpiration. Mention the factors that affect transpiration. List the role of stomata in transpiration. List the significance of transpiration.	Definition of transpiration. Mechanism of transpiration. Factors affecting transpiration. Types and significance of transpiration. Demonstration of transpiration by: Beljar method Cobalt chloride paper method.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 4 Life Process (Physiology)	
Sub-unit: 4.4 Photosynthesis	Hrs. theory 2
Objectives:	Content:
Define photosynthesis and autotrophic nutrition in plants. Identify the sites of photosynthesis. Describe photolysis of water. Describe the role of photosystem I and photosystem II in light reaction. Explain the process of non-cyclic and cyclic photophosphorylation. State the first CO_2 acceptor molecule in dark reaction. State the first stable carbon compound in dark reaction. Discuss the importance of photosynthesis.	Definition of photosynthesis. Mechanism of photosynthesis. Light reaction Dark reaction (C_3 cycle). Experiments: To demonstrate that CO_2 is necessary for photosynthesis To demonstrate that O_2 is evolved during photosynthesis. Importance of photosynthesis.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 4 Life Process (Physiology)	
Sub-unit: 4.5 Respiration and Fermentation	Hrs. theory 4
Objectives:	Content:
Define respiration and fermentation. Explain the mechanism of aerobic and anaerobic respiration giving examples of each. Identify the sites of respiration. Differentiate anaerobic respiration from aerobic respiration.	Definition of respiration. Types of respiration. Mechanism of respiration: Glycolysis Kerb's cycle Electron transport system.

Write down the reactions and the enzyme systems involved during glycolysis and Kreb's citric acid cycle. Describe electron transport system and oxidative phosphorylation. Calculate the number of ATP molecules produced during complete break down of one glucose molecule. Name the organisms involved in alcoholic fermentation. Correlate fermentation with our daily life.	Experiments To demonstrate aerobic respiration To demonstrate anaerobic respiration. Differences between anaerobic and aerobic respiration. Definition of fermentation. Importance of fermentation in our daily life.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 5 Genetics	Hrs. theory 9
Sub-unit: 5.1 Heredity and Variation	Hrs. theory 2
Objectives:	Content:
Define necessary and variation Tell about the causes of variations Tell the terms: alleles, genotype, phenotype, clone, gene pool, gene frequency, etc. Differentiate clone from offspring.	Definition of heredity and variation Difference between heredity and variation Difference between clone and offspring
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 5 Genetics	
Sub-unit: 5.2 Mendel's Law of Inheritance	Hrs. theory 2
Objectives:	Content:
Define the terms: trait, dominance, recessive, multiple allele, hybrid, test cross, reciprocal cross, etc. Tell an idea of gametogenesis on the basis of separation of allelic gene. Mention the concept of random mixing of characters in dihybrid cross. List the ratio of monohybrid cross and dihybrid cross. Mention why Mendel chose pea for his experiment.	Description of Mendel's monohybrid cross and dihybrid cross. Mendel's law of inheritance
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 5 Genetics	
Sub-unit: 5.3 Genetic Interaction	Hrs. theory 2
Objectives:	Content:
Tell the concept of genetic interaction List examples in plants. Give an example of Co-dominance Explain the concept of antigens and antibody reaction with reference to human ABO blood group.	The phenomenon of incomplete dominance with example Co-dominance with example. ABO antibody-antigen reaction.

Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 5 Genetics	
Sub-unit: 5.4 Determination of sex in humans	Hrs. theory 2
Objectives:	Content:
Tell about autosome and sex chromosome. Describe the concept of sex determination in mammals, insects, birds and Drosophila. Explain why the female has no responsibility in determining the sex of a child in humans. Tell the concept of heterogametic male and heterogametic female.	Description of autosomes and sex-chromosomes Types of sex-determination : Heterogametic males XX female - XY male XX female - XO male Heterogametic females ZO female - ZZ male ZW female - ZZ male
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 6 Environmental Biology	Hrs. theory 7 Hrs. lab 6
Sub-unit: 6.1 Abiotic and Biotic Factors of Ecosystem.	Hrs. theory 3 Hrs. lab 6
Objectives:	Content:
Define ecology and ecosystem. List the abiotic factors of ecosystem List the biotic factors of ecosystem. Mention the main source of energy in any ecosystem Describe the flow of energy in ecosystem. Describe the inter relationship between abiotic and biotic factors.	Definition of ecology and ecosystem. Structural and functional component of ecosystem Flow of energy in ecosystem Relationships between abiotic and biotic factors.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 6 Environmental Biology	
Sub-unit: 6.2 Pollution of Water and Air.	Hrs. theory 2
Objectives:	Content:
Define pollution. List biodegradable pollutants. List non- biodegradable pollutants. List sources of water pollutants. Identify the causes of water pollution. List the preventive measures to control water pollution. List the sources of air pollutants. List the feet of air pollution. Mention the preventive measures to control air pollution..	Definition of pollution and pollutants. Types of pollutants. Source of water pollution, their effect and preventive measures. Source of air pollutants, their effect on living organisms and preventive measures of air pollution.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.

Course: Botany	
Unit: 6 Environmental Biology	
Sub-unit: 6.3 Ecological Imbalances.	Hrs. theory 2
Objectives:	Content:
Explain the theory of the "green house effect". List the causes of green house effect. Tell the consequences of green house effect. Discuss the significance of green house effect, and explain why many scientists believe it will create a global crisis. Tell how acid rain is formed List the harmful effects of acid rain List the importance of the ozone layer for living organisms. Tell how some scientists believe the ozone layer is going to deplete. Describe the consequences of depletion of the ozone layer.	Description on green house effect, acid rain and depletion of the ozone layer.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 7 Economic Botany	**Hrs. theory 10** **Hrs. lab 4**
Sub-unit: 7.1 Medicinal plants	Hrs. theory 4 Hrs. lab 4
Objectives:	Content:
List the habit and distribution of medicinal plants. List the uses of medicinal plants. Identify the parts of the plant which have medicinal value. Name the chemical compounds from particular medicinal plants. Tell what form of plant part is used for the treatment of specific cases.	The habit, distribution, parts used, medicinal value and uses of following medicinal plants. : *Mentha arvensis* (Pudina) *Adhatod visica* (Asuro) *Zinger officinalis* (Aduwa) *Rauwolfia serpentina* (Sarpagandha) *Cinnamomum Zylenica* (Dalchini) *Datura stromonium* (Dhaturo) *Paparer somniferum* (Opium) *Atropa Belladona* (Belladona) *Ephedra gerardiana* (Bhutukesh) *Plantago ovata* (Esnovgol) *Santalum album* (Shreekhanda) *Cochicum luteum* (Colchium) *Eletteris Cordamonum* (Alaichi) *Digitalis Purpurea* (Foxglove) *Mella asadirachta* (Bakenu) *Dcimum Sanctum* (Tulsi) *Aloe vera* (Gheukumari) *Ajadiachita indica* (Neem) Cordyceps *Sinensis* (Yarsagumba) *Orchis latifolia* (Panchanle)
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 7 Economic Botany	
Sub-unit: 7.2 Nutritional Values of Cereal Crops, Fruits, Vegetables and Oil Yielding Plants.	Hrs. theory 4

Objectives:	Content:
Identify the nutritional value of cereal crops. List the nutritional value of vegetables. Tell the nutritional value of fruits. Tell the nutritional value of oil yielding plants. Compare the nutritional value of rice maize, white, gram and bean. Compare the nutritional value of mango, grape, pear banana and orange. Compare the nutritional value of potato, cauliflower, cabbage, tomato and brinjal. Compare the nutritional value of mustard, groundnut and caster.	The nutritional values of cereal crops; fruits, vegetables and oil yielding plants: Cereal crops - rice, wheat, maize, gram, and bean. Fruits- mango, banana, grape, pear and orange Vegetables- cauliflower, cabbage, tomato potato, brainjal Oil yielding plants - mustard, ground nut, caster
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 7 Economic Botany	
Sub-unit: 7.3 General Concept on Ethnobotany.	Hrs. theory 2
Objectives:	Content:
Define the term 'ethnobotany'. Describe the kinds of information included in traditional knowledge. Discuss ways of gathering traditional knowledge. Discuss the value and importance of traditional knowledge. List the ways ethnobotany is useful in the field of medicine. Discuss how to gather information about the use of local plants in medicine.	Definition of ethnobotany. Importance of ethnobotany in the field of medicine. A survey questionnaire for data collection, if the plant is used as medicine.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 8 Biotechnology	Hrs. theory 7
Sub-unit: 8.1 Introduction to Biotechnology	Hrs. theory 2
Objectives:	Content:
Define biotechnology. List the branches of biotechnology. List the scope of biotechnology. Describe the application of biotechnology in medicine and fermentation technology.	Definition of biotechnology. Scope of biotechnology. Application of biotechnology in relation to: Medicine Fermentation.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 8 Biotechnology	
Sub-unit: 8.2 Tissue and Organ Transplantation	Hrs. theory 2
Objectives:	Content:
Define tissue and organ transplantation. Tell about 'tissue banks'.	Definition of tissue and organ transplantation. Types of transplantation.

Compare allograft with heterograft. Describe the process of organ transplantation. List the role of immunosuppressants. Discuss the concept of rejection. List the methods to reduce rejection. Discuss the idea of introducing an artificial device in an animal body.	Autograft Isograft Heterograft Allograft Methods to reduce the chances of rejection.
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Course: Botany	
Unit: 8 Biotechnology	
Sub-unit: 8.3 Genetic Engineering	Hrs. theory 3
Objectives:	Content:
Define genetic engineering Tell the concept of target gene or foreign gene. List the role of vectors in DNA cloning. Mention the function of restriction enzymes - endonuclease and DNA ligase. Tell why endonuclease is called 'molecular scissors'. List the features of vector. List the strategies of cloning. Describe the applications of genetic engineering in the field of medicine. Tell about the possible dangers of genetic engineering.	Definition of genetic engineering and recombinant DNA technology. Method of DNA cloning requirements (tool of DNA cloning) cloning strategies Application of genetic engineering. Possible dangers of genetic engineering. .
Evaluation methods: oral and written tests, home assignments.	Teaching / Learning activities & resources: classroom instruction, illustrations, diagrams, visuals, textbooks, reference books.
Oral tests, home assignments, written examination	Class room instruction, Illustrations, Diagrams, Visuals
Minimum Standards: achieve 40% accuracy in theory; 60% in lab	Text books , Reference books

Botany Practical

Course: Botany Practical	
Unit: 1. Introduction to the compound microscope	Hrs. theory 2
Objectives:	Content:
Define compound microscope. Differentiate between simple and compound microscope. Tell the names of lenses used in a compound microscope. List different parts of a compound microscope and their uses. Calculate the magnifying power of a compound microscope in different combinations of objective lens/eye-piece lens. Describe the way of handling a compound microscope. Draw a well labeled diagram of a compound microscope by observation.	A compound microscope. Methods of handling of a compound microscope.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: classroom instruction, demonstration and

	return demonstration.
Course: Botany Practical	
Unit: 2. Cell biology	Hrs. theory Hrs. lab 6
Sub-unit: Temporary slide preparation of plant cells.	Hrs. theory Hrs. lab 4
Objectives:	Content:
List the apparatus required to prepare temporary slides of plant cells. List the chemicals required to prepare temporary slides of plant cells. List the function of safranim and glycerin. Describe the method of slide preparation from the epidermal layer of onion scale, fradescantia leaf, hydrilla leaf, Geranium leaf. Compare the cell structure of onion scale, tradescantia leaf, Hydrilla leaf, and Geranium leaf. List the characteristics of the cellular structure of each. Describe the method to peel out the epidermal layer in each case. Tell why you should use glycerin instead of water when mounting a temporary slide. Draw diagrams of each by observing temporary slides under the microscope.	The preparation of temporary slides of plant cells. The different cellular structure of plant cells.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: classroom instruction, demonstration, return demonstration, slide preparation, microscopic observation.
Course: Botany (Practical)	
Unit: 2. Cell biology	
Sub-unit: Different stages of mitosis and meiosis divisions from permanent slides.	Hrs. theory Hrs. lab 2
Objectives:	Content:
Define mitosis and meiosis. Describe different stages of mitosis like interphase, prophase metaphase, and anaphase and telophase. List the nuclear changes in each stage of mitosis. Tell the types of cells where mitotic cell division takes place. Give the examples of mitotic cell division in plants. Describe different stages of meiosis by observation of permanent slides under the compound microscope. Tell the time period of meiotic cell division of the plant. Name the type of cell where meiotic cell division occurs. List the significance of mitosis and meiosis. Draw figures of mitosis and meiosis by observing under the microscope.	The different stages of mitosis and meiosis with the help of permanent slides.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: classroom instruction, demonstration, return demonstration, observation of permanent slides.
Course: Botany Practical	
Unit: 3 Biodiversity	Hrs. theory Hrs. lab
Sub-unit: Gram staining process to identify the bacteria.	Hrs. theory Hrs. lab 6
Objectives:	Content:

Define bacteria Describe the nature of bacterial cells. List the components of the bacterial cell wall. list the required material and chemicals for Gram staining. List the role of chemicals used in Gram staining. differentiate Gram positive bacteria from Gram negative bacteria. Draw diagrams of bacteria by observing under the microscope.	1. The method of Gram staining of bacteria.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: classroom instruction, demonstration and return demonstration, slide preparation by smearing, microscopic observation.
Course: Botany Practical	
Unit: 3 Biodiversity	
Sub-unit: Vegetative structure and reproductive stages of Spirogyra and Nostoc	Hrs. theory Hrs. lab 2
Objectives:	Content:
Define prokaryotic and eukaryotic cells. Describe the vegetative structures of Spirogyra and Nostoc. Differentiate filament from trichomr. Tell the reasons why Spirogyra is so called. Explain the function of heterosis in Nostoc. Describe the reproductive stages of Spirogyra and Nostoc. Draw figures of these as observed under the microscope. Give the systematic position of Nostoc and Spirogyra.	Classification, vegetative structure, and reproductive stages of Spirogyra and Nostoc.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities / Resources: classroom instruction, demonstration and return demonstration, preparation and observation of temporary slides.
Course: Botany Practical	
Unit: 3 Biodiversity	
Sub-unit: Vegetative structure and reproduction of selected fungi	Hrs. theory Hrs. lab 6
Objectives:	Content:
Define fungi. Tell the meaning of mycelium, lypha, metuli, clestothecium. Describe the vegetative structure and reproductive stages of: mucor aspergillus penicillium claviceps purpurea Differentiate between poisonous mushrooms and edible mushrooms. Draw figures of both poisonous and nonpoisonous mushrooms by observing under the microscope.	1. The vegetative structure and reproductive stages of: mucor aspergillus penicillium claviceps purpurea 2. The morphological features of mushrooms.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: demonstration and return demonstration, slide observation, examination of mushroom specimens.
Course: Botany Practical	

Unit: 3 Biodiversity	
Sub-unit: Bryophytes, pteridophytes, aymnosperms and angiosperms	Hrs. theory Hrs. lab 14
Objectives:	Content:
List the characteristics of bryophytes. Differentiate liverworts from moss. List the characateristcs of pteridophytes. Differentiate bryophytes from pteridophytes. Discuss the concepts of gametphyte and sporophyte. Explain why pteridophytes are also called cascular cryptograms. List the morphological features of angiosperms. Differentiae gymnosperms from angiosperms. Differentiate dicot plants from monocot plants. Describe the parts of a flower: pedicel calyse corolla androecium gynoecium Draw figures of each of the plants which are observed during the lab experience.	The characteristics of bryophytes with reference to marchania and moss (funaria). 2. Morphological features of gymnosperms with reference to pinus. Morphological features of pteridophytes with reference to ferns (dryopteris). The different parts of dicot plants and monocot plants. different parts of a typical flower.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: demonstration and return demonstration of characteristics of herbaria (museum specimens and living specimens).
Course: Botany Practical	
Unit: 4 Plant physiology	Hrs. theory Hrs. lab 10
Sub-unit: Demonstration of physiological experiments	Hrs. theory Hrs. lab 10
Objectives:	Content:
Define diffusion, osmosis, photosynthesis, respiration and transpiration. Describe the types of : osmosis respiration transpiration List the required material to demonstrate each experiment. Tell the concept of hypotonic, hypertonic and isotonic solution. Discuss the procedure to demonstrate each physiologic experiment. Describe the result and conclusion of each experiment. List the precautions and possible risks of each experiment. Draw the necessary figures to show the demonstration of each experiment.	Process of diffusion by copper sulfate crystal. The osmosis process by egg membrane method and by potato osmoscope. Oxygen is evolved during photosynthesis. Carbon dioxide is necessary for photosynthesis (Moll's experiment) Carbon dioxide and heat evolved during aerobic respiration. Chlorophyll is essential for photosynthesis. Carbon dioxide gas is evolved during aerobic respiration. Transpiration by: Bell-jar method, Cobalt chloride method, and relation between transpiration and absorption.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: demonstration and return demonstration, self study of text book.
Course: Botany Practical	
Unit: 5 Ecology	Hrs. theory Hrs. lab 2
Sub-unit: Adaptational features of selected plants	Hrs. theory Hrs. lab 2
Objectives:	Content:
List the morphological features of xerophytic plants (eg.	1. Xerophytic and hydrophytic plants.

pinus). Describe how xerophytic plants compensate for insufficient water supply. List the morphological features of hydrophytic plants (eg. hydrilla). Tell about the mode of water conduction by hydrophytic plants.	
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: demonstration and return demonstration, observation of museum specimens.
Course: Botany Practical	
Unit: 6 Genetics	Hrs. theory Hrs. lab 4
Sub-unit: Structure of DNA	Hrs. theory Hrs. lab 2
Objectives:	Content:
Describe the structural components of DNA. List the components of a nucleotide. Explain the concept of the base pairing rule. Describe the purine and pyrimidine compoiinds of a DNA molecule. List the functions of DNA. Draw a figure of the Watson and Crick model of DNA by observation of a model.	1. Watson and Crick model of DNA structure.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: demonstration and return demonstration, examination of DNA model.
Course: Botany Practical	
Unit: 6 Genetics	
Sub-unit: Survey of some human heredity characteristics	Hrs. theory Hrs. lab 2
Objectives:	Content:
List some hereditary characteristics of humans. Describe the role of dominant or recessive genes to express certain characteristics. Discuss the methods of data collection of hereditary characteristics. Calculate the frequency of each hereditary characteristic in certain populations.	The role of dominant or recessive genes to express some hereditary characteristics of humans.
Evaluation methods: performance observation, written exams, viva.	Teaching / Learning activities & resources: survey to observe the phenotypic appearance of some hereditary features among the students.

5. Subject: Zoology

Hours Theory: **120**
Hours Practical: **60**
Assessment Marks: **100**

Course Description

This basic course in zoology discusses the characteristics of unicellular and multicellular structures. The course contains introductory zoology, cell biology, animal diversity, economic zoology, life process of mammals, evolution of organisms, relationships between organism and environment and a brief introduction about snakes found in Nepal. In order to be more relevant to the students of health science, the course involves a detailed study of different kinds of tissues, the life history of relevant parasites, and a detailed study of the anatomy and physiology of mammals.

Practical zoology includes the study of microscopes, a general study of animal kingdom (museum specimens), preparation of temporary slides, dissection of mammals so as to expose different systems and the life cycle of mosquitoes and houseflies.

Course Objectives

At the end of the course, the student will be able to:

Tell the meaning, scope and different branches of zoology.
Explain structure and functions of different kinds of tissues in a body.
Identify diversified forms of animal life.
Explain different kinds of parasites and arthropods related to human welfare.
Describe different systems of mammals.
Describe how organisms of today have been evolved from the ancestral ones.
Describe the relationships of organisms with their surrounding (physical and chemical) environments.
Identify common poisonous and nonpoisonous snakes and their effects.
9. Handle microscope properly.
Identify different kinds of animals.
Prepare temporary slide mount of the given specimen.
Dissect the mammal so as to expose its different systems.
Describe different stages in the life cycle of mosquitoes and houseflies.

Minimum Standards

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in lab.

Recommended Texts

Aggarwal, S. 1998. A Textbook of Biology Part II. Vikas Publishing House Pvt. Ltd., New Delhi, India.
Shukla, G.S. and Upadhyay, V.B. 1993. Economic Zoology. Rastogi Publications, Meerut, India.
Kotpal, R.L. 1997. Modern Textbook of Zoology, Invertebrates. Rastogi Publications, Meerut, India.
Kotpal, R.L. 2000. Modern Textbook of Zoology, Vertebrates. Rastogi Publications, Meerut, India.
Chatterjee, K.D. 1981. Parasitology. Chatterjee Medical Publishers, Calcutta, India.

Verma, P.S., Practical Zoology (Invertebrate)
Verma, P.S., Practical Zoology (Chordate)

Reference Books

Paniker, C.K. 1993. Textbook of Medical Parasitology. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, India.
Wilson, Kathleen J.W. and Waugh, A. 1998. Anatomy and Physiology. Churchill Living stone, U.K.
Singh, Dr. V. and Jain, Dr. D.K. 1998. Nootan Biology. Nageen Publication, Meerut, India.
Vidyarthi, R.D. and Pandey, P.N. 1998. A Textbook of Zoology. S. Chand and Company Ltd., New Delhi, India.
Chevalking, H., Tuladhar T. and Shrestha U. 1992. Integrated Sciences. Health Learning Materials Centre, P.O. Box 2533, Ktm., Nepal.
Majupuria, T.C. 1996. Modern Approach to Zoology. Asha Kapur, Old Jawahar Nagar, India.
Gupta and Malik, Practical Zoology (Invertebrate)
Gupta and Malik, Practical Zoology (Chordate)

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Course: Zoology	Hrs. theory 120 Hrs. lab
Unit: 1 Introduction to Zoology	Hrs. theory 2 Hrs. lab
Sub-unit: 1.1 Definition, scope and branches of zoology	Hrs. theory 2 Hrs. lab
Objectives:	Content:
State the meaning of Zoology. Describe the economic, literary and aesthetic values of Zoology. Differentiate the different branches of Zoology.	Meaning of Zoology Scope of Zoology Different branches of Zoology related to medical science: On the basis of structure and function - morphology, anatomy, physiology, histology, cytology. On the basis of specific unit or field - toxicology, genetics, embryology, evolution, mycology, microbiology, ecology, parasitology, paleontology, taxonomy. On the basis of specific group - entomology, helminthology, protozoology, bacteriology, virology.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study.
Course: Zoology	
Unit: 2 Cell Biology	Hrs. theory 21
Sub-unit: 2.1 An Introduction to cell biology	Hrs. theory 4
Objectives:	Content:
Define cell organelles and cell inclusions. List different kinds of cell organelles and cell inclusions. Describe the occurrence, shape and size, number and functions of different types of cell	Meaning of cell organelles and cell inclusions. Structural and functional study (occurrence, shape and size, number and function) of different types of cytoplasmic and nucleoplasmic contents.

inclusions and cell organelles: Cytoplasmic contents - mitochondria, endoplasmic reticulum, golgi complex, lysosome, ribosome, micro-bodies and tubules, centriole and centrosome, vacuoles, cilia and flagella. Nucleoplasmic contents - chromatids, nucleolus, nature of nuclear membrane, etc. Differentiate between cytoplasm and nucleoplasm, cristae and cisternae, lysosome and ribosome, microtubules and microfilaments.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, demonstration of microscopic slides with different cell types, demonstration of microscopic slides with different cell types.
Course: Zoology	
Unit: 2 Cell Biology	
Sub-unit: 2.2 Tissues and their types	Hrs. theory 6
Objectives:	Content:
Define a tissue. Name different types of tissues (Epithelial tissues, Connective tissues, Muscular tissues, Nervous tissues). Describe structure, function and location (in our body) of each of the following tissue types: Simple epithelium tissue Squamous epithelium Cuboidal epithelium Ciliated cuboidal Brushbordered cuboidal Columnar epithelium Ciliated columnar Brushbordered columnar Pseudostratified epithelium Compound epithelium tissue Stratified epithelium Stratified squamous epithelium (keratinised epithelium and non-keratinised epithelium) Stratified cuboidal epithelium Stratified columnar epithelium transitional epithelium Glandular epithelium tissue and its types as Based on the kind of secretion and the duct present Exocrine glands Endocrine glands Based on number of cells Unicellular Multicellular Based on the shape and complexity Simple exocrine glands (simple tubular, simple coiled tubular, simple branched tubular, simple alveolar, simple branched alveolar) Compound exocrine glands (compound	Definition of tissue and its types. Functions of epithelial tissues i.e. protection, secretion, excretion, absorption, exchange of materials/gases, sensory. Structural and functional study of different types of epithelial tissues. Location of different types of epithelial tissues in different regions of our body. Different types of epithelial glands and their structure and functions.

tubular, compound alveolar, compound tubular-alveolar glands). Based on the mode of secretions Merocrine glands Apocrine glands Holocrine glands Based on the nature of secretion Mucous glands Serous glands Mixed glands	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, audiovisuals showing epithelial tissues.
Course: Zoology	
Unit: 2 Cell Biology	
Sub-unit: 2.3 Connective tissues	Hrs. theory 6
Objectives:	Content:
Define connective tissue. Describe briefly the characteristics, structure and functions of different types of cells forming connective tissues (Cell types – Fibroblasts, Macrophages or Histocytes, Mast cells, Plasma cells). Describe briefly the characteristics and structure of different types of cell fibres forming connective tissues (Types of fibres - Collagen or white fibres, Elastic or yellow fibres, Reticulate fibres). List different types of connective tissues in our body. Describe structure, function and location (in our body) of each of the following tissue types: Connective tissue proper Loose connective tissue Areolar Adipose Dense connective tissue White fibrous tissue Tendons Ligaments Supportive connective tissue Bone Spongy bone Compact bone Cartilage Hyaline cartilage Elastic cartilage Fibrous cartilage	Definition of connective tissue and its types. Structural and functional study of different types of connective tissues. Location of different types of connective tissues in different regions of our body. Composition and functions of blood and blood plasma, etc.

Fluid connective tissue (Haemopoietic tissue) Myeloid Blood Lymphoid Lymph Identify composition of blood and blood plasma, functions of blood plasma, structure, usual number and functions of erythrocytes, leucocytes and thrombocytes. Differentiate between blood plasma and serum.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, audiovisuals showing connective tissues and fibers.
Course: Zoology	
Unit: 2 Cell Biology	
Sub-unit: 2.4 Muscular tissues	Hrs. theory 3
Objectives:	Content:
Define muscular tissue. Name different types of muscular tissues (striated, unstriated and cardiac). Describe the basic structural characters of muscular tissues. Describe location (in our body), structure and functions of striated or skeletal muscle. Describe location (in our body), structure and functions of unstriated or smooth muscle. Differentiate between single-unit and multi-unit smooth muscles. Describe location (in our body), structure and functions of cardiac muscle. Differentiate between striated, smooth and cardiac muscles of animals.	Definition of muscular tissue and its types. Structure and function of different types of muscular tissues. Location of different types of muscular tissues in different regions of our body. Differences between striated, smooth and cardiac muscles of animals.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, audiovisuals showing muscular tissues.
Course: Zoology	
Unit: 2 Cell Biology	
Sub-unit: 2.5 Nervous tissues	Hrs. theory 2
Objectives:	Content:
Define nerve tissue and neurons. List the basic properties of neurons - excitability and conductivity. Describe the structure of a neuron. Differentiate between dendron and axon. Describe the structures of myelinated or medullated nerve fibre and non-myelinated or non-medullated nerve fibre. Define neuroglia cells and list their functions. Differentiate between neuron and neuroglia cell.	Definition of nervous tissue and its types. Structural and functional study of different types of nervous tissues.

Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, audiovisuals showing nervous tissues.
Course: Zoology	
Unit: 3 Diversity of Animal Life	Hrs. theory 6
Sub-unit: 3.1 Concept of taxonomy	Hrs. theory 2
Objectives:	Content:
Define taxonomy. Define species as a basic unit of classification. Distinguish between artificial and natural classification. Identify features studied in natural classification. List modern criteria for classification of animals. Define the terms used in classification.	Definition of taxonomy, species as a basic unit of classification, systematics, taxon, lower and higher taxa. Different systems of classification. Differences between artificial and natural classification.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study.
Course: Zoology	
Unit: 3 Diversity of Animal Life	
Sub-unit: 3.2 Binomial nomenclature and classification	Hrs. theory 4
Objectives:	Content:
Define nomenclature and binomial nomenclature. Identify the importance of nomenclature. Identify the system adopted by the International Code of Zoological Nomenclature. Write scientific names of commonly found animals. List common names and binomial names of those animals which are used in medical science; identify the useable body parts of each. Describe each of the five kingdoms of classification with examples. Identify the interrelationships among these kingdoms. Define producers, consumers, decomposers, saprophytes and symbionts. Describe nutrition in all five kingdoms.	Binomial system of nomenclature adopted by Carolus Linnaeus (1707-1778). Selected examples of binomial nomenclature of animals. Five kingdom system of classification. Chief characteristics and examples of five kingdoms.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, visuals showing the five kingdom classification of animals.
Course: Zoology	
Unit: 4 Economic Zoology	Hrs. theory 45
Sub-unit: 4.1 Hosts and parasites	Hrs. theory 3
Objectives:	Content:
Define hosts and parasites in general. Define different kinds of parasites - ecto and endo-parasites, temporary and permanent parasites, facultative and obligatory parasites, occasional or accidental and wandering or aberrant parasites. Define different kinds of hosts - intermediate,	Meaning of hosts and parasites Common types of hosts and parasites with examples. Types of relationships between a host and a parasite. Delicate adjustments between hosts and parasites.

definitive and paratenic (transport) hosts. Give examples for different kinds of hosts and parasites. Name at least 20 different parasites and their usual hosts. Define mutualism, commensalism and parasitism with examples of each. Identify different attributes of parasites - infectivity, invasiveness, pathogenicity and toxigenicity. Identify the specific and non-specific resistance factors of hosts. Summarize the delicate adjustments between a host and a parasite.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, illustrations, slides.
Course: Zoology	
Unit: 4 Economic Zoology	
Sub-unit: 4.2 Medically important protozoans	Hrs. theory 16
Objectives:	Content:
Describe the morphology of trophozoite, pre-cystic and cystic stages of *Entamoeba histolytica*. Define minuta and magna forms, convalescents and carriers. List characteristics of cysts. Identify the usual host and the infective stage of *Entamoeba histolytica.* Describe the life history of *E. histolytica* using a labeled diagram. Discuss the relationship between amoebic ulcer and amoebic dysentery. Explain the medical significance of the stages of development of a cyst. Describe the mode of infection, brief life history, pathogenic significance and preventive measures of *Entamoeba gingivalis*. Define ciliated protozoa. Describe the usual habitat and morphology of *B. coli*. Describe the pathogenic significance of *B. coli.* Describe control measures of *B. coli*. Identify usual habitat of *Plasmodium vivax*. Describe the life history of *Plasmodium vivax* using a labeled diagram. Define nutrition in *Plasmodium.* List control measures of *P. vivax.* Define flagella and flagellated protozoans. Identify the process of infection of flagellates to man. Describe brief life history, morphology, pathogenic significance and control measures of *Trichomonas vaginalis*, *Giardia lamblia* and *Leishmania donovani* using a labeled diagram. Identify the usual habitat of *Trypanosoma gambiense* and *Trypanosoma cruzi*. Describe briefly the life histories, pathogenic	Morphology, life cycle and pathogenic effects of *Entamoeba histolytica* and *Entamoeba gingivalis*. Life history, pathogenic significance and control measures of *Blantidium coli* and *Plasmodium vivax*. Pre- and exo-erythrocytic schizogony, erythrocytic schizogony, post-erythrocytic schizogony and sexual cycle in the stomach of mosquito-sporogony. Haemozoin, shuffner's dots, signet ring stage. Flagellated protozoans and their process of infection to man. Morphology, life cycle, pathogenic significance and control measures of *Giardia lamblia* and *Leishmania donovani*. Habit and habitat, brief life history, pathogenic effects and preventive measures of *Trypanosoma gambiense* and *Trypanosoma cruzi*.

effects and preventive measures of *T. gambiense* and *T. cruzi*.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study charts, slides, diagrams.
Course: Zoology	
Unit: 4 Economic Zoology	
Sub-unit: 4.3 Medically important helminthes	Hrs. theory 14
Objectives:	Content:
Describe the habit and habitat, life cycle, pathogenic significance and prevention of : *Paragonimus westermani* *Schistosoma mansoni* *Opisthorchis sinensis* *Taenia solium* *Taenia saginata* *Hymenolepis nana* *Diphyllobothrium latum* *Echinococcus granulosus* *Ascaris lumbricoides* *Ancyclostoma duodenale* *Trichuris trichiura* *Enterobius vermicularis* *Wuchereria bancrofti* *Dracunculus medinensis* Distinguish between blood and intestinal parasites.	Habit and habitat, life cycle, pathogenic significance and prevention of helminthic parasites of man. Distinctions between blood and intestinal parasites.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study charts, slides, diagrams.
Course: Zoology	
Unit: 4 Economic Zoology	
Sub-unit: 4.4 Medically important arthropods	Hrs. theory 14
Objectives:	Content:
Describe the distribution, habit and habitat, brief life history, and control measures of: Mangemite (*Sarcoptes scabiei*) Straw Itch or Harvest Mite (*Pyemotes ventricosus*) Chiggers (*Eutrombicula alfreddugesi*) Cockroaches (*Periplaneta americana*) Houseflies (*Musca nebulo*) Mosquitoes (*Culex*, *Anopheles* and *Aedes*) Sand flies (*Phlebotomus argentipes*) Human louse (*Pediculus humanus*) Bed bug (*Cimex*) Fleas (*Xenopsylla cheopis*) List diseases caused or transmitted by each of them. Distinguish between pathogenic and non-pathogenic insects. Distinguish between reservoirs and vectors.	Distribution, habit and habitat, brief life history, and control measures of some medically important arthropods. Diseases caused by each of them. Differences between pathogenic and non-pathogenic insects and differences between reservoirs and vectors.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study charts, slides, diagrams.

Course: Zoology	
Unit: 5 Life Process of Mammals	Hrs. theory 28
Sub-unit: 5.1 Digestive system	Hrs. theory 5
Objectives:	Content:
Define food and nutrition. List the basic kinds of nutrients - carbohydrates, proteins, lipids, vitamins, enzymes, minerals. Identify the role of nutrients in the body of organisms. Define digestion and digestive system. List organs involved in digestive system. List parts of alimentary canal. Describe structure and functions of the parts of alimentary canal. Describe structure and functions of liver and pancreas. List digestive functions of salivary glands, gastric glands and intestinal glands. Identify the regions of food digestion (oral cavity, stomach, duodenum, jejunum and ileum) in the alimentary canal of mammals. Name digestive enzymes present in different regions of food digestion in the alimentary canal of mammals. Describe the functions of each of these enzymes in the digestion of different nutrients present in the foodstuffs of mammals. Name the end products of digestion of the nutrients such as carbohydrates, proteins and lipids, etc. Identify the sites for the absorption of digested foods in the alimentary canal of mammals. Describe the processes of absorption of food products through the absorption sites to the blood circulation. Identify the general composition of feces and the process of egestion.	Nutrition in mammals. Oral cavity, pharynx, esophagus, stomach, small intestine and large intestine. Structure and functions of significant regions of alimentary canal and associated digestive glands. Digestion of carbohydrates, proteins and lipids Absorption sites and processes of absorption of digested food General composition of feces.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study charts, slides, diagrams.
Course: Zoology	
Unit: 5 Life Process of Mammals	
Sub-unit: 5.2 Respiratory system	Hrs. theory 4
Objectives:	Content:
Define respiration and respiratory system. Identify the need of respiration. Describe the passage of air during respiration. Describe structure and functions of the respiratory organs and associated structures. Describe mechanisms of: External respiration (ventilation mechanisms) Internal or cell respiration Transport of oxygen and carbondioxide. Define the terms: Dead space, Bohr effect, Chloride shift, Residual and Tidal volume.	Definition of respiration Passage of air during respiration Structure and functions of different parts of the respiratory system _ nostrils, nasal cavity, larynx, trachea, bronchus and bronchioles, lungs, respiratory muscles, etc. Mechanism of pulmonary respiration (ventilation) Physiology of respiration Terminologies used in respiration.

Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, slides, diagrams.
Course: Zoology	
Unit: 5 Life Process of Mammals	
Sub-unit: 5.3 Circulatory system	Hrs. theory 6
Objectives:	Content:
Define the heart of mammals. Describe external and internal structures of the heart. Describe the course of blood circulation in heart. Identify origin of heartbeat and rate of heartbeat of mammals. Describe conduction of heart waves (impulses). Identify control of heart working. Define the terms such as Pacemaker, Heart sound, etc. Differentiate arterial blood and venous blood. Differentiate arteries and veins. Define capillaries and capillary network. Describe arterial blood circulation - systemic and pulmonary. Describe venous blood circulation - systematic (including hepatic portal system) and pulmonary.	Definition and structure of the heart of mammals. Origin, conduction and regulation of heart beat. Blood pressure and arterial and venous blood circulation.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals showing heart, blood vessels and course of blood circulation.
Course: Zoology	
Unit: 5 Life Process of Mammals	
Sub-unit: 5.4 Excretory system	Hrs. theory 4
Objectives:	Content:
Define excretion and excretory system. Name the types of excretory organs in mammals such as skin, lungs, liver and kidney. List excretory functions of skin, lungs, liver and kidney. Describe external and internal structure of a kidney. Describe the structure of a nephron. Describe the process of urine formation in mammals. List composition of urine. Summarize functions of different regions of a nephron. Define micturition and its causes. Explain the homeostatic function of the kidney.	Meaning of excretion, types of excretory organs and their functions. External as well as internal structure of a kidney. Structure of a nephron. Mechanism of urine formation (glomerular filtration, selective reabsorption, tubular secretion) and functions of different regions of a nephron. Micturition and homeostasis.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals showing internal and

	external structures of the kidney, uriniferous tubules.
Course: Zoology	
Unit: 5 Life Process of Mammals	
Sub-unit: 5.5 Reproductive system	Hrs. theory 3
Objectives:	Content:
Define reproduction and its types - sexual and asexual. Differentiate between sexual and asexual reproduction. Describe structure and functions of primary sex organs or gonads (testes and ovaries). Identify the secondary sex organs of males (prostrate, seminal vesicles, vas deferens and penis) and females (fallopian tubes, uterus, vagina and mammary glands). Describe the structure and function of epididymus and the duct system of male. Give composition of semen. Give short description on spermatogenesis. Describe the structure and functions of the duct system of female (fallopian tubes, uterus and vagina) carrying spermatozoa from vagina to the fallopian tube. Give a short description on ovulation and menstruation.	Meaning of sexual and asexual reproduction. Structure and functions of male and female reproductive organs. Formation of sperms, ova and menstruation process.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals.
Course: Zoology	
Unit: 5 Life Process of Mammals	
Sub-unit: 5.6 Nervous system	Hrs. theory 6
Objectives:	Content:
Define nervous system. Identify communication of information With the outside world through eyes, ears, nose, tongue and skin. Within the body through nerve impulses and chemical substances. Summarize functions of nervous system. Name types of nervous system - central, peripheral and autonomous. Describe meninges of brain and subarachnoid space. List functions of cerebrospinal fluid. Differentiate grey and white matter of central nervous system. Describe structure and functions of brain and spinal cord. Define a nerve, nerve fibre and neuron. Identify the types of nerve fibres (afferent and efferent). Distinguish between sensory nerve fibre and motor nerve fibre. Identify number, origin and distribution of different types of spinal and cranial nerves. Define reflex action with examples.	Communication and coordination of informations through agencies of nervous system. Structure and functions of different types of (central, peripheral and autonomous) nervous systems. Brain, meninges, cerebrospinal fluid, white and gray matter of central nervous system and transmission of nerve impulses.

Describe physiological process of nerve impulse conduction. Define preganglionic fibres, autonomic ganglia and postganglionic fibres. Describe sympathetic and parasympathetic nervous system.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals.
Course: Zoology	
Unit: 6 Evolution	Hrs. theory 8
Objectives:	Content:
Define evolution and organic evolution. Describe historical background of organic evolution. Give examples of organic evolution. Distinguish between progressive and retrogressive evolution. Develop geological time scale showing evolutionary stage of different organisms. Summarize the evolution of modern man starting from human ancestors *Dryopithecus*. Describe the evidence of organic evolution: morphological and anatomical, palaeontological, biochemical, genetic and embryological. Describe Lamarck's theory of evolution giving examples cited by him. Identify drawbacks of Lamarck's theory. Describe Darwin's theory of evolution. Identify drawbacks of Darwin's theory. Describe mutation theory of evolution. Describe modern synthesis theory of evolution.	Evolutionary history and evolution of different organism including the evolution of modern man. Evidences of organic evolution. Different theories of organic evolution.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals of geological time scale showing evolutionary stages.
Course: Zoology	
Unit: 7 Organism and Environment	Hrs. theory 8
Sub-unit: 7.1 Ecosystem	Hrs. theory 6
Objectives:	Content:
Define ecosystem and its types. Identify major types of ecosystem - aquatic and terrestrial. List abiotic and biotic components of ecosystem. Describe abiotic factors of ecosystem: temperature, light, moisture, pH, soil, carbon dioxide, and oxygen. Describe biotic factors of ecosystem: autotrophs, heterotrophs and decomposers. Identify interacting system of biotic factors: Positive interactions - commensalisms, mutualism, proto-cooperation,	Structural and functional organization of ecosystems. Examples of ecosystems and their types. Abiotic and biotic factors of ecosystem and their interrelationships. Food chain, trophic level and energy relations in an ecosystem.

colonization, social organization and aggregation. Negative interactions (antagonism) - predation, parasitism, competition and antibiosis. Define food chain and trophic level. Develop a diagrammatic representation of food chain. Describe the ecosystem of a pond. Describe the ecosystem of a grassland environment. Describe energy and energy relations in an ecosystem.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals.
Course: Zoology	
Unit: 7 Organism and Environment	
Sub-unit: 7.2 Community and succession	Hrs. theory 2
Objectives:	Content:
Define community. Identify materials that make a biotic community. Define succession. Identify changes during succession. Differentiate primary and secondary succession with examples. Illustrate climax community. Define sere, mimicry and camouflage.	Definition of community and succession. Characteristics of a community. Composition and structure of a community. Basic types of succession.
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals.
Course: Zoology	
Unit: 8 Poisonous and nonpoisonous snakes	Hrs. theory 2
Objectives:	Content:
List physical characteristics and habits of snakes. Identify specific characteristics of poisonous snakes in Nepal. Distinguish between poisonous and non-poisonous snakes. Identify the poisonous snakes commonly found in Nepal and tell their geographical distribution. Distinguish between a poisonous snakebite and a non-poisonous snakebite. Identify the nature and types of snake venum according to their effects in our	Characteristics of poisonous and non-poisonous snakes and their differences. Different types of poisonous snakes commonly found in Nepal. Snake bite, venum and its effects to our body.

body.	
Evaluation methods: oral tests, home assignments, written examination	Teaching / Learning activities and resources: classroom instruction, discussion, textbook /reference book self study, charts, diagrams and visuals.
Course: Practical Zoology	Hrs. theory Hrs. lab 60
Unit: 1 Use of the microscope	Hrs. theory Hrs. lab 4
Objectives:	Content:
Name different types of microscopes and their components. Handle a microscope properly. Observe the given slides under the microscope in different levels of magnification. Draw a labeled diagram of a microscope. View given slides under the microscope. Note the characteristic features of the given specimen. Identify the given slide and specimen. Classify the specimen and slide properly.	Microscope, function of its different parts and observation techniques.
Evaluation methods: practical performance tests, viva.	Teaching / Learning activities and resources: classroom instruction, demonstration, return demonstration.
Course: Practical Zoology	
Unit: 2 General study of the animal kingdom	Hrs. theory Hrs. lab 24
Objectives:	Content:
Study given slides and specimens. Draw diagrams of given specimens. Write down the characteristic features of given specimens and slides. Identify the main features of each slide and specimen. Classify the specimens properly.	Different types of museum specimens: Protozoa: Rhizopoda : - *Entamoeba histolytica* Mastigophora : - *Euglena, Giardia, Leishmania* Ciliata : - *Paramecium* Porifera: Sycon Coelenterata: Hydra Platyhelminthes: Cestodes : - *Taenia saginata, Taenia solium, Echinococcus granulosus* Nemathelminthes: *Ascaris lumbricoides, Trichuris trichiura, Enterobious vermicularis, Ancyclostoma duodenale, Wuchereria bancrofti.* Annelida: Earthworm, Leech. Arthropoda: Crustacea: - Prawn, Crab. Arachnida: - Scorpion, Spider Insecta: - *Anopheles and Culex* (including life cycle), *Pediculus, Cimex* Mollusca: Unio and Pila Echinodermata: Starfish Chordata: Pisces: - *Scoliodon, Labeo rohita* Amphibia: - Frog, Toad, Hyla Reptilia: - Wall lizard, *Natrix*, *Naja*, *Bungarous*, *Viper*, Tortoise Aves: - Crow and Pigeon. Mammalia: - Bat, Anteater B
Evaluation methods: practical performance tests,	Teaching / Learning activities and resources: classroom

viva.	instruction, demonstration, return demonstration.
Course: Practical Zoology	
Unit: 3 Preparation of slides	Hrs. theory Hrs. lab 6
Objectives:	Content:
Demonstrate how to tight a striated muscle specimen and stain the slide. Identify the nucleus of a striated muscle cell. Draw and label a diagram of striated muscle cell. Prepare a temporary slide mounting of *Pediculus* and *Cimex*. Draw labeled diagrams of *Pediculus* and *Cimex*.	Preparation of temporary mounts of striated muscle, *Cimex* and *Pediculus*.
Evaluation methods: practical performance tests, viva.	Teaching / Learning activities and resources: classroom instruction, demonstration, return demonstration.
Course : Practical Zoology	
Unit: 4. Dissection of mammals	Hrs. theory Hrs. lab 22
Objectives:	Content:
Name the dissecting instruments and their uses. Dissect selected animal specimens. Dissect the systems of the animals provided. Draw a labeled diagram of each system of the animals provided. Examine the mammalian heart and use of a stethoscope to hear the heart beat.	Instruments used for dissections Techniques of dissecting mammals Components of systems of mammals (digestive, arterial, venous, reproductive, brain) through direct observation of the preserved body.
Evaluation methods: practical performance tests, viva.	Teaching / Learning activities and resources: classroom instruction, demonstration, return demonstration.
Course: Practical Zoology	
Unit: 5 Life cycle of *Anopheles* and *Culex* mosquitoes and housefly.	Hrs. theory Hrs. lab 4
Objectives:	Content:
Describe the different stages of life cycle of mosquitoes and houseflies in given specimens. Identify the characteristics of different stages of life cycles. Draw a labeled diagram of each stage of the life cycles.	Stages in the life span of *Anopheles* and *Culex* mosquitoes and housefly. Characteristics of the stages of each life cycles.
Evaluation methods: practical performance tests, viva.	

6. Subject: Chemistry

Hours Theory: 120
Hours Practical: 60
Assessment Marks: 100

Course Description

This course is designed to give students the fundamental concepts of physical, organic and non-organic chemistry. Emphasis is given to the principles related to chemistry within every day life and to the application of chemistry in medical science. An additional function of the course is to stimulate interest in the application of chemistry, and to prepare the student for further study in this field.

Chemistry practical acquaints the student with use of related laboratory equipment and provides practical application of learned theory which is relevant to paramedical and health laboratory work.

Course Objectives

Upon completion of the course the student will be able to:

1. Explain the basic chemical changes involved in normal body processes.
2. Identify the chemical reactions involved in maintaining homeostasis of the body.
3. Describe the chemical basis for medical treatments, both somatic and pharmacological.
4. Utilize chemical principles in laboratory testing.
5. Explain the chemical responses that occur within the body during illness.
6. Apply the theoretical knowledge of chemistry to the study of microbiology, pathology, and pharmacology.

Minimum Standards

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended Texts

1. Mitra, Ladli Mohan, A textbook of Inorganic Chemistry. Ghosh & Co. Current edition.
2. Tuli, G.D. et al., Intermediate Organic Chemistry. S. Chand & Co. Current edition.
3. Jauhar, S.P., Modern ABC's of Chemistry (vol. I & II). Modern Publishers. Current edition.

Reference Texts

1. Jha, J.S., & Gugliani, S.K., A Textbook of Chemistry. Seirya Publication. Current edition.
2. Shamim, A.S., Intermediate Referesher Course in Chemistry. Vipin Prakasar. Current edition.
3. Sthapit, M. & Pradhananga, R.R., Fundamentals of Chemistry (vol. I & II). Taleju Prakashar. Current edition.

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Course: Chemistry	Hrs. theory 120 Hrs. lab 60
Unit: Physical Chemistry	Hrs. theory 56 Hrs. lab
Sub-unit: Elements, compounds and chemical change	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. List the symbols of elements. 2. Identify monovalent, divalent, trivalent elements and radicals. 3. List the information conveyed by symbol and formula. 4. Identify physical and chemical change. 5. Identify the suitable process for separating constituents of a mixture. Q. What are the differences among H^+,H^-,H_2, $2H_2$, 2H? Q. Write the molecular formula of potassium ferrocyanide sodium peroxide.	1. Symbols for the atom, molecule, and compound radical and variable valency. 2. Writing, a chemical formula. 3. Significance of symbol and formula 4. Molecular and empirical formulas. 5. How the chemical compound differs form mechanical mixture. 6. Pure and impure substances. 7. The processes of separating the constituents of a mixture: sublimation, distillation, fractional distillation, crystallization, magnetic separation, gravity separation chromatography.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – Reaction of sodium on water
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 2. Chemical equations	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Construct a graphical representation of the relationship between amount of reactant and product with time. 2. Describe ways to make the equation more informative. 3. Demonstrate how to balance a chemical equation. 4. Explain any seven types of reaction with two examples of each. 5. Tell whether mass is conserved or not in the examples above. Q. What is the quantitative significance of a chemical equation?	1. Chemical equation, reactant and product. 2. Significance and limitations of chemical equations. 3. Ways of making chemical equations more informative. 4. Conditions by which reactions take place – Contact, heat, light, percussion, electricity, bio-chemical agents, catalyst, sound 5. Types of chemical reactions (seven-types) with examples. 6. Balancing a chemical equation by: a. trial and error method b. partial equation method 7. Laws of stoichiometry (i) Law of conservation of mass (ii) Law of constant proportion (iii) Law of gaseous volume (iv) Law of reciprocal proportion
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Theoretical explanation, Classroom instruction exercises, Demonstration – Reaction of a piece of zinc with excess acid.
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 3. Periodic table	Hrs. theory 2 Hrs. lab
Objectives:	Content:

1. Identify the location of S,P,d, and f – block elements. 2. Define atomic radii, electro-negativity IP, EA. 3. Identify alkali and alkaline earth metals, halogens, noble gases, transition metal, radioactive elements and indicate their location. Q. Which one, Cl or Br, is more electronegative and why?	1. Modern periodic classification of elements. 1. Location of S,P,d and f-block elements 2. Periodocity in properties by: (i) Atomic radii (ii) Electronegativity (iii) Ionisational potential (iv) Electron affinity
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – Reaction of a piece of zinc with excess acid. Chart display: Long and short form of periodic table.
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 4. States of matter - Gaseous state	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Compare the volume of gas at different conditions (pressure and temperature). 2. Compare the rates of diffusion of different gases. Q. Which one, CO_2 or SO_2, diffuses faster and why?	1. Effect of pressure and temperature on volume of gas. 1. Simple derivation of ideal gas equation (PV=nRT) 2. Diffusion and effusion of gas. 3. Dependence of rate of diffusion with temperature and density. 4. NTP or STP
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – Reaction of a piece of zinc with excess acid
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 4. States of matter - Liquid state	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Define solubility and solve problems based on solubility. 2. Define viscosity and surface tension. 3. List their applications. 4. Describe effect of temperature on viscosity and surface tension. 5. Demonstrate the basic concept of (i) Lowering of vaporization pressure (ii) Elevation of boiling point (iii) Depression of freezing point (iv) Osmotic pressure 6. Demonstrate the basic concept of the varit Hoff theory of dilution. Q. Why water can flow more easily than honey?	1. Unsaturated, saturated and supersaturated solution. 2. Solubility and related numerical problems. 3. Viscosity and surface tension and their applications. 4. Effect of temperature on viscosity and surface tension 5. Colligative properties. (i) Lowering of vapour pressure (ii) Elevation of boiling point (iii) Depression of freezing point (iv) Osmotic pressure. 6. Ideal and non-ideal solutions.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – Compare viscosity of glycerol and

	kerosene.
Course: Chemistry	Hrs. theory 56 Hrs. lab
Unit: Physical Chemistry	Hrs. theory Hrs. lab
Sub-unit: 4. States of matter - Solid State	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Define amorphous and crystalline solids and give examples. 2. List the examples of crystallization, deliquescent, hygroscopic, efflorescent, Isomorphism, liquid crystal and substances. Q. Some medicines (tablets) should not be exposed to air. Why?	3. The difference between amorphous and crystalline solids. 4. Water of crystallization, deliquescent, hygroscopic, efflorescent, Isomorphism, liquid crystal.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – FeCl3 exposed to air, blue vitriol heated
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 5. Atomic structure - Solid State	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Define electron, proton & neutron with their charge and mass. 2. List the postulates of Bohr's atomic model. 3. Design electronic configuration of elements (up to Z = 30) 4. Define radioactive decay with common examples. 5. Explain the use of radiation in the field of medicine. 6. Describe the pollution due to radioactivity. Q. Compare the properties of Alpha, Beta and Gamma rays.	1. Charge and mass of fundamental particles of atoms. 2. Bohr's atomic model. 3. Shell, sub-shell and orbital (S, P, d, f) 4. How electrons are arranged in orbits (Af bau principle) 5. Atomic number, mass number, atomic weight and gram atomic weight. 6. Isotopes and isobars. 7. Radioactive substance, radioactive decay and radiation (Alpha, Beta, Gamma rays) 8. Effect of radiation to health. 9. The use of radiation in the medical field (Radiotherapy).
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration.
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 6. Electronic theory of valency	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Define valence electron, duplet, octet and noble gas electronic configuration. 2. Describe the Lewis structure of different molecules. 3. List the properties of electrovalent, covalent and co-ordinate covalent bond. Q. Why is ammonia readily soluble in water?	1. Valence electron, duplet, octet and Noble gas electronic configuration. 2. The mode of formation and properties of compounds. (i) Electrovalent (ii) Covalent (iii) Co-ordinate covalent 3. Polar and non – polar covalent bond and compound. 4. Effect of Hydrogen bond on: (i) increase in m.p and b.p.

	(ii) viscosity (iii) solubility of covalent compound in water.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 7. Oxidation and Reduction	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Identify oxidation half, reduction half, oxidant and reductant. 2. List some redox reactions taking place in the human body.	1. Classical concept and electronic concept of oxidation and reduction. 2. Oxidant and reductant. 3. Importance of oxidant and reductant in Biological process, sterilization and disinfection, bleaching and spot removal. 4. Oxidizing action of O_3, HNO_3, $KMnO_4$, $K_2Cr_2O_7$, SO_2 5. Reducing action of Carbon, H_2S, NH_3, SO_2, $Sncl_2$, Hg_2cl_2 and metals.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration .
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 8. Electrochemistry	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Differentiate between (i) Electrolytes and non-electrolytes (ii) Strong electrolytes and weak electrolytes. (iii) Ions and atoms. 1. Describe the variation of degree of ionization with (i) dilution (ii) temperature (iii) nature of electrolyte (iv) solvent (v) presence of foreign ion. 2. State and explain common ion effects. 3. State briefly Faradays' laws of electrolysis. 4. Compare the P^H of neutral water above and below 25^0C. 5. Define buffer solution (acidic and basic) 6. Solve numerical problems related with P^H of acidic or basic solutions. Q. Explain why NaCl becomes ionized in water while glucose does not.	1. Electrolytes, Non-electrolytes, strong and weak electrolytes. 2. Arrhenius theory of ionization. 3. Degree of ionization, Faradays' laws of electrolysis. 4. Electrolysis of water. 5. Ionic product of water, P^H, P^{OH} 6. Buffer solution, mechanism of buffer action, buffer capacity and range. 7. P^H of buffer and Henderson's equation. 8. Importance of P^H and buffer in human body.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration

Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 9. Acid, base and salt	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Compare general properties of acid, base and salts. 2. Define weak and strong acid and base. 3. Define neutralization. 4. List the different types of salts. 5. Identify the nature of salt solution. 6. Identify the requirements for the substance to be antacid and antabase. 7. Define HSAB and its application. Q. Acetic acid is used as kitchen species but not sulfuric acid. Why?	1. Characteristics of acid and base. 2. How acid neutralises carbonate and bicarbonate. 3. Various types of salts. 4. Nature of aqueous solution of salts. 5. Antacids and antabases and their medical uses. 6. Hard and soft acids and bases (HSAB) 7. Application of HSAB Principle.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – Reaction between: carbonate and acid, acid and base
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 10. Solutions - True solution	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Define osmosis, reverse osmosis, osmotic pressure, isotonic, hypotonic and hypertonic solutions. 2. Discuss the importance of osmosis phenomenon. Q. What will happen if a paste of sodium chloride is placed over swollen body part? Q. "We feel thirsty when taking large amounts of NaCl." Explain why.	1. Dilute and concentrated solution. 2. Diffusion of solute in solution, osmosis, osmotic pressure (P=CRT) isotonic, hypotonic and hypertonic solution, reverse osmosis. 3. Biological importance of osmosis.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration – Add crystals of $KMnO_4$ in water and observe
Course: Chemistry	Hrs. theory 56 Hrs. lab
Unit: Physical Chemistry	Hrs. theory Hrs. lab
Sub-unit: 10. Solution – Colloids	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Identify the particle size in true solution, colloidal and suspension. 2. Compare the lyophilic and lyophobic solutions With regard to the following characteristics: electrical charge, solution, viscosity, precipitation, Tyndal effect, Brownian movement.	1. Comparison between true solution, colloidal solution and suspension. 2. Difference between lyophilic and lyophobic solutions. 3. Types of colloidal systems. 4. coagulation of solutions by – boiling, electrophoresis, addition of electrolyte.

3. List examples of different types of colloidal systems.	5. Dialysis, associated colloids and macromolecules. 6. Application of colloids in the medical field and in everyday life- precipitation of smoke, kidney dialysis machines, clarification of municipal water. 7. Emulsions, gels and gelation. 8. Methods of protection of colloids.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 11. Mole concept and chemical arithmetic	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Relate no of mole with gram molecular weight, number of particles and volume occupied (for gas). 2. Identify limiting and excess reagent. 3. Estimate the amount of reactant required and product formed in any reaction. Q. What volume of oxygen at NTP is required to oxidize 10 gram glucose and what volume of CO_2 will be formed?	1. Mole and Avogadros' number. 2. Determination of percentage composition. 3. Numericals related to the following relationships based upon chemical equation- Mass – Mass relationship Mass – volume relationship Volume – volume relationship 4. Calculation based on limiting reagent.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration
Course: Chemistry	
Unit: Physical Chemistry.	
Sub-unit: 12. Volumetric analysis	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Define different units of concentration and show their relation. 2. Prepare standard solution of desired concentration and solve problems on dilution. 3. Solve different numericals regarding acidimetry and alkalimetry. Q. What mass of sodium chloride is required to prepare a decinormal solution in 250ml.? Q. The doctor prescribes three antacid tablets to decrease acid strength from N/10. If the fluid material is 100ml., calculate the amount of base present in each antacid tablet. The equivalent weight of the base in the antacid is 100.	1. Equivalent and gram equivalent weight of Element, acid, base, salt, radicals, oxidant and reductant. 2. Titration, acidimetry, alkalimetry, end point, indicator, primary standard substance. 3. Ways of expressing concentration of solution in terms of – Normality, Molarity, molality % by mass, % by volume, Gm/liter, specific gravity, parts per million (PPm). 4. Normality and molarity equations. 5. Calculations to prepare different concentrations of solution. 6. Calculations based on reaction.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration

Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 13. Chemical kinetics	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Define reversible and irreversible reaction. 2. State the law of mass action. 3. Explain the effect of pressure, temperature and catalyst on the equilibrium state. 4. Explain how the catalyst and temperature hasten the reaction rate. 5. Tell the effect of increasing concentration in the case of zero, first and second order reaction. 6. Compare the characteristics of enzyme reaction with zero order reaction. Q. Discuss the rate of bio-chemical reaction in high fever.	1. Reversible and irreversible reaction. 2. Variation of reactant, product and rate of reaction with progress of reaction (graphical representation) 3. The statement of law of mass action. 4. Le Chateliers' principle and effect of pressure, temperature, concentration and catalyst on equilibrium state. 5. Activation energy and activated complex. 6. Energy profile diagram of catalysed and uncatalysed reaction. 7. Variation of reaction rate with – Concentration, temperature, nature of reactant, surface area, light and catalyst. 8. Zero, first and second order reactions (no derivation).
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 14. Catalysis	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Define catalyst and explain its role. 2. List important enzymes and explain their role. Q. How does an enzyme act as a catalyst?	1. Types of catalysis- Homogeneous, heterogeneous, positive, negative, auto catalysis. 2. Characteristics of catalytic reaction. 3. The terms catalytic poisoning, promoters, and inhibitors. 4. Theories of catalysis: a. Intermediate compound formation b. Adsorption 5. Enzyme catalysis. 6. Mechanism and characteristics of enzyme catalysis. 7. Effect of P^H and temperature on enzymatic activity. 8. Enzyme inhibition.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration- heat potassium chlorate with MnO_2 and without MnO_2.
Course: Chemistry	
Unit: Physical Chemistry	
Sub-unit: 15. Chemical thermodynamics	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Match the systems, surroundings and boundaries with our body. 2. Identify whether heat is evolved or absorbed when salt is added to water. 3. Identify that energy is evolved in any combustion process.	1. The terms systems, surroundings and boundaries (Matching with our body). 2. Isothermal and adiabetic process. 3. The terms – Internal energy, enthalpy, bond energy, heat of combustion, heat of formation, heat of vaporization

4. Tell which foods contains more amounts of chemical energy. Q. How does an enzyme act as a catalyst?	and solution. 4. Exothermic and endothermic process and reactions. 5. Statement and derivation of the first law of thermodynamics. 6. Physical meaning of Q=Delta E+W with different conditions. 7. Spontaneous and non – spontaneous process. 8. Driving force of spontaneous process – enthalpy, entropy and Gibbs free energy. 9. Statement of Hess law. 10. Combustion of fuel and food. 11. Calorific value of food. 12. Sun as the primary source of energy. 13. Application of thermodynamics in our daily life.
Evaluation methods: written exam, oral and written assignments, performance observation in lab	Teaching / Learning activities and resources: classroom instruction, theoretical explanation, problem solving, demonstration
Course: Chemistry	
Unit: Organic Chemistry	Hrs. theory 40 Hrs. lab
Sub-unit: 16. An introduction to organic chemistry	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. List the difference between organic and inorganic compounds. 2. List the importance of organic compounds in medicines and drugs with common examples.	1. Origin, of organic chemistry – Vital force theory and modern theory. 2. Difference between organic and inorganic compound. 3. Sources of organic compound 4. Importance of organic compound in medical field: Antipyretics, analgesics, antibiotic, antimalarials, tranquilizers, antidepressants, germicides, antiseptic, Insecticides and herbicides.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-Unit: 17. Nomenclature of organic compounds	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Tell the reasons for large number of organic compounds. 2. Classify the organic compounds into various types. 3. Describe functional group with different examples. 4. Describe characteristics of homologue. 5. Use the IUPAC system for nomenclature. Write down the name and structure of the following functional groups: $CONH_2$, COOH	1. Reason for large number of organic compounds – Tetravalency, catenation property, isomerism. 2. Various types of organic compounds with their examples. 3. Functional group and its various types. 4. Homologous series with examples 5. Prefix, primary suffix, secondary suffix, and principal functional group. 6. Naming aliphatic and aromatic compounds with common and IUPAC systems.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	

Unit: Organic Chemistry	
Sub-unit: 18. Isomerism	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Describe the different kinds of isomers. 2. Explain chiral carbon, optically active substance. 3. Identify dextro – rotatory and laevo – rotatory. 4. Enantiomers of lactic acid and tartaric acid.	1. Definition of isomerism. 2. Structural isomerism of the types- postitional, functional, chain metamerism and tautomerism. 3. Stereosisomerism of the types – Geometrical and optical.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub Unit: 19. Organic reaction and mechanism	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Identify the nature of reaction. 2. Create concept about writing mechanism of simple reactions. 3. Describe whether racemic mixture is obtained or not in SN^1 and SN^2 reaction. Q. What are attacking reagents? Give two examples of each.	1. Substrate and attacking reagents. 2. Inductive effect (+1 and –1 effect) 3. Homolysis and heterolysis bond fission/ 4. Electrophiles and Nucleophiles. 5. Electromeric effect. 6. The types of organic reactions – Electrophilic and nucleophilic substitution, addition, elimination, rearrangement. 7. Reaction mechanism of the above mentioned reactions. 8. SN^1 and SN^2 reaction.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 21. Hydrocarbons	Hrs. theory 5 Hrs. lab
Lesson: A. alkane	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Describe the isomerism in alkane. 2. Describe the substitution in alkanes. 3. Describe the knocking of fuel.	1. The physical properties of alkanes. 2. Chemical properties- Stability, halogenation combustion, pyrolysis. 3. Uses in everyday life. 4. Antiknocking agents and their adverse effect to enviornment.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 21. Hydrocarbons	Hrs. theory 5 Hrs. lab
Lesson: B. alkene	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Describe the addition reaction. 2. Describe the test of alkene.	1. Preparation of ethene form ethanol. 2. The physical properties. 3. The chemical properties- Combustion, hydrogenation, with Br_2 solution, with

	halogen acid, with Baeyers reagent, polymerization, ozonolysis. 4. Uses in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 21. Hydrocarbons	Hrs. theory 5 Hrs. lab
Lesson: C. alkyne	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Describe the addition reaction in alkyne. 2. Explain the acidic nature of alkyne. 3. Describe the test of alkyne	1. Preparation of ethyne form calcium carbide and from chloroform. 2. Physical properties of acetylene. 3. Chemical properties –Combustion, hydrogenation, catalytic hydration, with Br2 solution,with Na, with tollens reagent, with Baeyers' reagent, ozonolysis polymerization, with Cl_2. 4. Markovnikovs' rule. 5. Uses of ehtyne in everyday life and in medicines.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 22. Alkyl halides	Hrs. theory 3 Hrs. lab
Lesson: A. ethyl iodide	Hrs. theory 1
Objectives:	Content:
1. List the properties and uses of ethyl iodide.	1. Preparation of iodoethane from ethanol. 2. Physical characteristics. 3. Chemical properties- hydrolysis, with KCN. 4. Uses in medical aspects and in every day life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 22. Alkyl halides	Hrs. theory 3 Hrs. lab
Lesson: B. chloroform	Hrs. theory 2
Objectives:	Content:
1. List the physical and chemical properties. 2. List the uses of chloroform and iodoform.	1. Preparation from ethanol. 2. Physical properties. 3. Chemical properties, reaction with: oxygen, KOH, HNO_3, acetone, silver. 4. Method of safe storage of chloroform. 5. Medical uses of chlororom. 6. Medical uses of iodoform.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	

Sub-unit: 23. Alcohol	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Classify alcohols. 2. Explain the process of fermentation.	1. Classification of alcohol as- monohydric, dihydric, polyhydric, primary, secondary and tertiary. 1. Identification of primary, secondary and tertiary alcohol by oxidation method. 2. Fermentation process and conditions required for it. 3. Preparation of ethanol from molasses by fermentation. 4. Percentage composition of alcohol in different beverage. 5. Denatured and absolute alcohol. 6. Physical properties of ethanol. 7. Chemical properties- Oxidation, with sodium, with oxygen, with H_2SO_4, CH_3COCl, CH_3COOH, combustion. 8. Biological oxidation of methanol and ethanol by NAD. 9. Uses of alcohol in medical field and in everyday life. 10. Physical properties of glycerol. 11. Chemical properties of glycerol- dehydration, with conc. H_2SO_4 and conc. HNO_3 12. Uses of Glycerol in medicine and in everyday life. 13. Uses of Nitroglycerine.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 24. Carbonyl compound	Hrs. theory 3 Hrs. lab
Lesson: A. formaldehyde	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Describe the physical and chemical properties of formaldehyde. 2. List uses of formaldehyde.	1. Preparation from methanol. 2. Physical properties. 3. Chemical properties- with ammonia, with NH_4OH, NaOH, Polymerisation. 4. The formation of- formose, para and meta formaldehyde, formalin. 5. Uses in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 24. Carbonyl compound	Hrs. theory 3 Hrs. lab
Lesson: B. acetone	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Identify ketonic compounds. 2. Describe the physical and chemical characteristics of ketonic compounds. 3. List uses of ketonic compounds.	1. Preparation from isopropyl alcohol and Ca-acetate. 2. Physical properties. 3. Chemical properties with- $NaHSO_3$, NH_3, Phenyl hydrazine. 4. Uses in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations

Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 25. Acetic Acid	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Identify the homologue of aliphatic monocarboxylic acid. 2. Describe the physical properties of acids (solubility, acidic character). 3. Describe the uses of vinegar. Q. Write down the uses of acetic acid.	1. Preparation from acetylene and ethanol. 2. Physical properties. 3. Chemical properties with- $NaHSO_3$, NH_3, C_2H_5OH, PCl_5 and reduction. 4. Uses in everyday life. 5. Uses of formic acid in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 26. Ether	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Identify homologue of ether with their common and IUPAC name. 2. Describe the physical and chemical properties.	1. Preparation from ethanol. 2. Physical properties. 3. Chemical properties with- Combustion, hydrolysis, reaction with HI and PCl_5. 4. Uses in medicine and in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 27. Aromatic compounds	Hrs. theory 7 Hrs. lab
Lesson: A. introduction	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Define aromatic compound and list the characteristics. 2. Identify the name of aromatic compounds and some heterocyclic compounds.	1. Aromatic compound. 2. Nomenclature of benzene derivatives (Mono, di and trisubstituted) 3. Explain benzene nucleus and side chain. 4. To define heterocyclic compounds. 5. Characteristics of aromatic compound.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 27. Aromatic compounds	
Lesson: B. benzene	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Describe the preparation, properties and uses of benzene.	1. Preparation from sodium benzoate and phenol. 2. Physical properties. 3. Chemical properties – Halogenation, nitration, sulphonation, Friedal Craft's reaction, combustion and hydrogenation. 4. Uses in everyday life.
Evaluation methods: written tests, written	Teaching / Learning activities and resources: classroom

assignments, performance observation	instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 27. Aromatic compounds	
Lesson: C. nitrobenzene	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Tell the formulae of aliphatic and aromatic nitrocompounds. 2. Describe the preparation, properties and uses of nitrobenzene.	1. Preparation from benzene. 2. Physical properties 3. Reduction product of Nitrobenzene in different medium. 4. Uses in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 27. Aromatic compounds	
Lesson: D. aniline	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. List the preparation, properties and uses of aniline.	1. Preparation of pure aniline from nitrobenzene. 2. Physical properties. 3. Chemical properties- Diazotisation reaction, coupling reaction, basic nature, with HCl, alkylation. 4. Uses in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 27. Aromatic compounds	
Lesson: E. phenol	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Identify the mono and dihydric phenols. 2. Explain preparation, properties and uses of monohydric phenol.	1. Preparation from Aniline. 2. Physical properties 3. Chemical properties- With $FeCl_3$, NH_3, PCl_5, NaOH, alkylation, nitration , Bromination, with phthalic anhydride, 4. Uses in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 27. Aromatic compounds	
Lesson: F. benzoic acid	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. List the preparation, properties and uses of benzoic acid.	1. Preparation from benzaldehyde and toulene. 2. Physical properties 3. Uses of benzoic acid. 4. Uses of salicylic acid and folic acid..

Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 28. Molecules of life	Hrs. theory 7 Hrs. lab
Lesson: A. carbohydrate	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Explain the natural sources of carbohydrates and their chemical composition. 2. List the functions and uses of carbohydrate.	1. Classification on the basis of solubility and hydrolysis.. 2. D-Glucose-occurrence, preparation forms sucrose and starch, physical properties, fermentation and uses. 3. D- Fructose-Occurrence, preparation from sucrose and insulin, physical properties, fermentation and uses. 4. Sucrose-Occurrence, physical properties, hydrolysis, action of heat and uses. 5. Lactose-Occurrence, enzyme hydrolysis, fermentation and uses. 6. Maltose-Occurrence, hydrolysis, fermentation and uses. 7. Starch-Occurrence, physical properties, reaction with iodine, hydrolysis and uses. 8. Cellulose–Occurrence, physical properties and uses.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 28. Molecules of life	
Lesson: B. proteins and enzymes	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Describe peptide linkage. 2. List the important functions of proteins. 3. Explain the importance of enzymes. 4. Explain the biological functions of nucleic acid.	1. Amino acid, and peptide bond. 2. Essential and non-essential amino acids. 3. Functions of amino acids. 4. Protein- Introduction, occurrence and function. 5. Chemical properties of protein, salt formation, hydrolysis, oxidation. 6. Denaturation of precipitation of protein and denaturation. 7. Enzymes – Introduction, characteristics, common examples and application.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 28. Molecules of life	
Lesson: C. vitamins and coenzymes	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Summarize the role of vitamins and coenzymes in human nutrition. 2. Discuss the food sources of vitamins and coenzymes. 3. List the effects of each vitamin and coenzyme	1. Vitamins and coenzymes. 2. Classification of vitamins, their sources, functions and effects due to their deficiency.

deficiency.	
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Organic Chemistry	
Sub-unit: 28. Molecules of life	
Lesson: D. Lipids	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Describe fat as esters of higher fatty acid. 2. Differentiate between fats oils. 3. Tell essential fatty acids.	1. The introduction of lipid, fat and oil and their natural sources. 2. Their physical properties. 3. Hydrolysis with acid and alkali. 4. The fats and oils as the source of energy.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Environmental Chemistry	Hrs. theory Hrs. lab
Sub-unit: 29. Pollution	Hrs. theory 5 Hrs. lab
Lesson: A. air pollution	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Define environment. 2. Define the following terms- Pollutant, contaminant, receptor, sink, speciation, threshold limit value (TLV) 3. Describe why is environment getting polluted.	1. The sources and adverse effects due to the following air pollutants- CO_2, SO_2, O_3, H_2S, CO, hydrocarbon, lead, cadmium dust, EFC, oxides of nitrogen. 2. Indoor air pollution. 3. Effect of air pollution on – human health, materials and climate.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Environmental Chemistry	
Sub-unit: 29. Pollution	Hrs. theory 5 Hrs. lab
Lesson: B. chemistry of acid rain	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Identify the cause of acid rain.	1. Pollutants of acid rain. 2. Adverse effects due to acid rain.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Environmental Chemistry	
Unit: 29. Pollution	
Lesson: C. water pollution	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Represent pictorially bioamplification. 2. Treatment of domestic waste.	1. Mode of water pollution 2. Water pollutants- Inorganic pollutants, organic pollutants, sediments and oils, domestic waste, industrial and agricultural waste, fluorides. 3. Effect due to water pollution.

Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Environmental Chemistry	
Sub-unit: 29. Pollution	
Lesson: D. radioactive pollution	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. List the negative effects due to radiation, ozone layer depletion and green house effect.	1. Radioactivity. 2. Its pollutants. 3. Effect due to radioactivity. 4. Ozone layer depleation. 5. Green house effect.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	Hrs. theory 16 Hrs. lab
Sub-unit: 30. Hydrogen	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Describe the preparation, properties and uses of hydrogen.	1. Preparation from water and acid. 2. Physical properties. 3. Chemical properties Combustion, reducing character, reaction with halogens, hydrogenation and preparation of vanaspati ghee. 4. Uses of hydrogen in everyday life 5. Nascent hydrogen, cause of reactivity. 6. Reaction of nascent hydrogen with $KMnO_4$ and $FeCl_2$.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 31. Oxygen	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. List preparation, properties and uses of oxygen. 2. Define and give suitable examples of oxides. 3. Discuss the occurrence and effects of ozone and ozone depletion in our atmosphere.	1. Preparation of oxygen form $KClO_3$, $KMnO_4$, Na_2O_2 and H_2O_2. 1. Physical properties of oxygen. 2. Chemical properties- Combustion with metal, non-metal, glucose and hydrocarbon. 3. Uses of oxygen in everyday life and in medical field 4. Various types of oxides Acidic, basic, neutral amphoteric, neutral and peroxides. 5. Occurrence and formation of ozone in the lab and in the atmosphere. 6. Physical properties and uses of ozone. 7. Ozone layer depletion and its effect.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	

Unit: Inorganic Chemistry	
Sub-unit: 32. Water	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Explain the cause of hardness of water. 2. Describe the chlorination of water. 3. List the advantage and disadvantage of hard water. 4. Explain the method of purification of drinking water. 5. Define degree of hardness of water. 6. Define heavy water.	1. Soft and and hard water. 2. The process of removal of hardness- Boiling, Dard's process, using washing soda, permutit process, soda – ash method, deionisation of water. 3. The advantage and disadvantage of hard water. 4. The meaning of drinking water. 5. Method of purification of drinking water by- boiling, candle filtration, chemical disinfection, bleaching powder, Cl_2 solution, iodine, $KMnO_4$, ozonisation, using potashalum. 6. The solvent property of water. 7. Defluoridation techniques for drinking water- Activated carbon and ion exchange method.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 33. Carbon and its oxides.	Hrs. theory 2 Hrs. lab
Lesson: A. carbon monoxide	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Define allotropes of carbon. 2. List properties of carbon monoxide. 3. Describe the chemical method to remove carbon monoxide.	1. Allotropes of carbon- diamond, graphite, coke, charcoal, lamp black, fullerene. 1. Preparation of carbon monoxide from – hydrocarbon, organic acid, and reduction of metallic oxide. 2. Physical properties of CO. 3. Chemical properties in reaction with - O_2, Cl_2, Ni, NaOH, CH_2Cl_2, and haemoglobin.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 33. Carbon and its oxides.	
Lesson: B. carbon dioxide	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. Describe the preparation of carbon dioxide. 2. List the properties and uses of carbon dioxide.	1. Preparation form carbonate bicarbonate and fuel. 2. Physical properties. 3. Chemical properties in reaction with –acidic nature, lime water, NaOH and carbon. 4. List the uses of CO_2 in everyday life.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 34. Nitrogen and ammonia	Hrs. theory 2 Hrs. lab
Objectives:	Content:

1. List the preparation, properties and uses of nitrogen and ammonia. 2. Tell the oxides of nitrogen.	1. Isolation of nitrogen by fractional distillation of liquor air. 2. Physical properties of N_2 3. Chemical properties of N_2 – Cause of inertness, in reaction with H_2 and O_2. 4. Natural fixation of nitrogen. 5. Preparation of ammonia from ammonium salt. 6. Physical properties of NH_3 7. Chemical properties of NH_3- Solubility, basic nature, with oxygen. 8. Uses of nitrogen and ammonia. 9. Five types of oxides of nitrogen and their adverse effects on human beings and atmosphere.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	Hrs. theory 16 Hrs. lab
Sub-unit: 35. Phosphorous	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Tell toxic nature of white phosphorous. 2. Define phosphorescence.	1. Occurrence of phosphorous in animal bones, ATP and ADP. 2. Properties of white phosphorous – with O_2, with Cl_2, with caustic alkali. 3. Uses of phosphorous. 4. Physical properties of phosphine gas. 5. The importance of calcium phosphate. 6. Use of Phosphoric acid.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 36. Sulphur	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. List the preparation, properties of H_2S and SO_2. 2. Discuss the acidic nature of SO_2 and SO_3.	1. Occurrence of sulphur in free and in combined state. 2. Burning of sulphur and sulphide to give SO_2 gas. 3. Medical uses of sulpur (Sulpha drugs, skin diseases) 4. Preparation of hydrogen sulphide from sulphides 5. Physical properties of H_2S. 6. Physical properties of SO_2. 7. Chemical properties of SO_2 (acidic nature, bleaching properties) 8. Physical properties of SO_3
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 37. Halogens	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Define halogens. 2. List the properties of halogens and hydrogen halides.	1. Physical properties of Fluorine, chlorine, bromine and iodine. 1. Uses of halogens. 2. Chemical properties of chlorine-

	Oxidizing action, bleaching action, in reaction with H_2, with slaked lime, and with organic compounds. 3. Preparation of hydrogen halide from halide salts. 4. Physical properties of hydrogen halides.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 38. Hydrogen peroxide	Hrs. theory 1 Hrs. lab
Objectives:	Content:
1. List the preparation, properties and uses of hydrogen peroxide.	1. Preparation form Na_2O_2 and BaO_2. 2. Physical properties. 3. Chemical properties- Decomposition, oxidizing and reducing action, with Pbs, bleaching properties. 4. Uses in everyday life and in medicines.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-Sub-unit: 39. Metallic compounds	Hrs. theory 1 Hrs. lab
Objectives	Content:
1. Identify whether metallic nitrates are soluble in water or not. 2. List the medical uses of metallic compounds.	1. The properties (Action of heat and solubility in water) of the following compounds- Metallic carbonates bicarbonates, sulphides, sulphates, oxides, hydroxides, nitrates and chlorides. 2. The physical properties and uses of the following compounds- $CuSO_4$, $HgCl_2$, Hg_2Cl_2, $Mg(OH)_2$, $Al(OH)_3$, plaster of Paris, epsom salt, bleaching power, white vitrol.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	
Unit: Inorganic Chemistry	
Sub-unit: 40. Minerals	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Describe the need of minerals. 2. Find their sources and importance.	1. Sources of the following minerals- Na, K, Ca, Mg, Fe, Zn, Ni, Cobalt. 3. Biological importance and effects due to their deficiency.
Evaluation methods: written tests, written assignments, performance observation	Teaching / Learning activities and resources: classroom instruction, problem solving exercises, demonstrations
Course: Chemistry	Hrs. theory 120 Hrs. lab 60
Unit: General Chemistry - Practical	Hrs. theory Hrs. lab 20
Sub-unit: 1. Introduction	Hrs. theory Hrs. lab 4
Objectives:	
1. Follow stated laboratory procedures and	1. Procedural rules and guidelines of the chemistry lab.

guidelines. 2. Describe safety and first aid measures for the chemistry lab. 3. Demonstrate the method for chemistry lab documentation.	2. Proper handling of equipment. 3. Lab safety measures. 4. Documentation procedures for laboratory work.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: General Chemistry - Practical	
Sub-unit: 2. Use of the Bunsen burner	Hrs. theory Hrs. lab 2
Objectives:	
1. Identify the names and functions of the parts of a Bunsen burner. 2. Describe the correct use of the Bunsen burner and its flame with: a. air holes closed b. with air holes open. 3. Differentiate between the uses of oxidizing and non-oxidizing flames.	1. The correct operation of the Bunsen burner. 2. Parts of the Bunsen burner. 3. Oxidizing and non-oxidizing flames.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: General Chemistry - Practical	
Sub-unit: 3. Simple lab operations	Hrs. theory Hrs. lab 14
Objectives:	
1. Separate sand and common salt in pure and dry states from a mixture of sand and common salt. 2. Separate sand and camphor from a mixture of sand and camphor. 3. Recover the precipitate obtained in pure and dry state when the given solution-A is treated with excess of solution-B. a. Solution-A = $BaCl_2$ solution b. Solution-B = $H2SO_4$ solution 4. Prepare a sample of clearly pure distilled water from impure water and carry out the test for purity of water thus prepared. 5. Prepare a sample of bazaar copper sulfate at laboratory temperature and use the solution to get pure crystals of salt. 6. Obtain sodium chloride by the neutralization of: a. bench of hydrochloric acid with a bench of sodium hydroxide. b. Sodium carbonate with hydrochloric acid. 7. Prepare a soluble derivative of barium carbonate and sodium chloride.	1. The process and methods of filtration. 2. Characteristics of filtrate and residue. 3. Chloride ion test. 4. Nature of mixtures and components. 5. Principles and processes of sublimation. 6. Characteristics of sublimates. 7. Characteristics of Precipitates. 8. Principles and process of precipitation. 9. The distillation process. 10. Properties of pure water. 11. Characteristics of saturated solutions. 12. Crystallization point and crystallization process. 13. Acid base reactions. 14. The principles and process of evaporation. 15. Characteristics of soluble and insoluble salts.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	

Unit: Inorganic Chemistry - Practical	Hrs. theory Hrs. lab 40
Sub-unit: 1. Preparation of gases	Hrs. theory Hrs. lab 6
Objectives:	
1. Prepare hydrogen, ammonia and carbon dioxide gases. 2. Identify the properties of hydrogen, ammonia and carbon dioxide gases.	1. Use of apparatus required for gas experimentation. 2. Chemicals used in gas experimentation. 3. Physical and chemical properties of selected gases.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: Inorganic Chemistry - Practical	
Sub-unit: 2. Salt analysis	Hrs. theory Hrs. lab 8
Objectives:	
1. Perform salt tests for acid radicals by dry and wet methods.	1. Procedures for identification of acid radicals in salt.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: Physical Chemistry - Practical	
Sub-unit: 3. Equivalent weights	Hrs. theory Hrs. lab 4
Objectives:	
1. Use a chemical balance to weigh various substances. 2. Determine the equivalent weight of a given metal by the hydrogen displacement from acid method.	1. The operation of a chemical balance scale. 2. The meaning of equivalent weight. 3. Calculation of equivalent weights.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: Physical Chemistry - Practical	
Sub-unit: 4. Acidimetry and alkalimetry	Hrs. theory Hrs. lab 8
Objectives:	
1. Standardize the given acid which is approximately decinormal. 2. Determine the strength of alkalai with the help of a standard acid supplied. 3. Determine the strength of acid in terms of: a. normality b. grams/liter c. percentage	1. Process of titration. 2. Acidimetry and alkalimetry. 3. Known and unknown solutions. 4. Substances with primary and secondary standards. 5. Preparation of solutions of various strengths. 6. Calculation of strengths of unknown solutions in terms of normality, molality, molarity, grams/liter, and percentage.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: Organic Chemistry - Practical	
Sub-unit: 5. Element detection	Hrs. theory Hrs. lab 8
Objectives:	

1. Detect the elements present in given organic compounds.	1. Process for detection of nitrogen, sulphur, halogens. 2. Selected chemical tests.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving
Course: Chemistry	
Unit: Organic Chemistry - Practical	
Sub-unit: 6. Identification of organic compounds	Hrs. theory Hrs. lab 6
Objectives:	
1. Identify given organic compounds systematically.	1. The identification of acetate, formate, formaldehyde, oxalate, oxalic acid, glycerol, acetone, ethyl alcohol, acetic acid, formic acid. 2. Selected chemical tests.
Evaluation methods: written and viva exams, performance observation in laboratory settings.	Teaching / Learning Activities / Resources: classroom instruction, text book self study, demonstration and return demonstration, laboratory practice, problem solving

7. Subject: Physics

Hours Theory: 120
Hours Practical: 60
Assessment Marks: 100

Course Description

This course in physics is designed to provide students with an understanding of the scientific laws of our physical world, and how physics contributes to life's activities in modern society. The course emphasizes both quantitative and qualitative aspects of physics, involving mathematical models and equations. The application of physics to social and environmental situations is well illustrated.

The practical component of this course is designed to supplement learning through the application of learned theory. The students will handle simple apparatus to do simple measurements, demonstrate simple electrical circuits, and apply their knowledge of physics to real life examples.

Course objectives

On completion of the course the student will be able to:

Sustain interest in physics and its applications related to everyday experiences of their life.
Identify the social, economic, environmental and other implications of physics.
Describe physics as a coherent and developing framework of knowledge based on fundamental theories of the structures and processes of the physical world.
Demonstrate the skills of experimenting, observing, interpreting data and evaluating evidence to formulate generalizations and models.
Apply knowledge of physical principles to familiar and unfamiliar situations.
Apply facts, vocabulary and conventions to unit measurements and common measuring instruments.
Explain the definitions, laws, concepts, theories and models presented in this course.
Describe the applications and implications of physical facts and principles.

Recommended Texts

1. Brij Lal and Subramanyan, Principles of Physics.
2. Nelkon and Parker, Advanced Level Physics (5th ed.)
3. Shrestha, V.P., Physics Practical Guide

Reference Texts

1. Pradhan, J.M. & Gupta, S.K., A Textbook of Physics (part I & II)
2. Verma, H.C., Concepts of Physics I & II
3. Sears, Zemansky & Young, University Physics
4. Halliday, D & Resnick, R., Physics Part I & II

Course: Physics	Hrs. theory 120	Hrs. lab 60
Unit: Mechanics	Hrs. theory 23	Hrs. lab 6
Sub-unit: 1.1 Units and Measurement	Hrs. theory 1	Hrs. lab 6
Objectives:	Content:	
Measure precisely mass, length, time, volume,	1. The use of meter scale, spring balance, physical	

density, pressure, and specific gravity. Define fundamental and derived units. Explain, MKS, CGS and SI system of units. Convert one system of units into another system of units. Express derived units in terms of fundamental units. Use of dimension to derive simple physical quantities and equations.	balance, stopwatch for measurement of length, mass and time. Basic table of measurement for units of mass, length and time. Demonstrate the use of vernier caliper, screw gauge, spherometer, physical balance, spring balance and measuring cylinder. Explain the physical concept of mass, length and time. Various systems of units and their conversion. Express derived units in terms of fundamental units. Dimensional formula for various physical quantities.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.2 Scalar and Vectors	Hrs. theory 2 Hrs. lab
Objectives:	Content:
Differentiate between vectors and scalars. Identify whether a physical quantity is scalar or vector. Resolve vectors into two rectangular components. Point out the resultant of two or more vectors by graphical method. Write the values of scalar product and vector product, for selected problems.	1. Scalar and vectors with examples. Vector addition by parallelogram and triangle method. Resolve a vector into two components. The product of two vectors either results in a scalar quantity or a vector quantity.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.3 Kinematics	Hrs. theory 3 Hrs. lab
Objectives:	Content:
Define displacement, velocity, instantaneous velocity, average velocity, uniform velocity and acceleration retardation. Differentiate between distance and displacement, speed and velocity. Deduce kinematics equation of motion (linear and gravitational). Calculate the time of flight, maximum height and horizontal range of a projectile. Solve simple problems related to the projectile.	1. Displacement, velocity, instantaneous velocity, average and uniform velocity and acceleration (retardation). 2. Distance and displacement, speed and velocity. 3.The concept of projectile motion.

Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.4 Force	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. State Newton's laws of motion. Give the concept of inertia of rest, motion and direction. Define force in terms of rate of change of momentum and give their directions. Derive F = ma and used it to solve simple problems. Recognize the impulse is a force act in very short interval of time. State and prove principle of conservation of linear momentum with examples. Define angular displacement, angular velocity & angular acceleration. Distinguish between angular velocity and linear velocity and derive relation between them. Define circular motion, centripetal force, and centrifugal force. State the magnitude and direction of centripetal and centrifugal force and their applications to centrifuge and satellite (not derivation). Differentiate between elastic and inelastic collision. Define friction, laws of limiting friction, angle of friction and coefficient of friction.	1. Linear momentum and significance of Newton's laws of motion in various concepts. 2. Interpret the meaning of inertia of rest and inertia of motion. Illustrate the applications of inertia and impulse. Angular displacement, velocity and acceleration Derive the relation $v = \omega r$. Recall vector nature of velocity and change the direction of velocity in circular motion. Know the magnitude of centripetal force and centrifugal force, $F = mv^2/r = mr\omega^2$. Friction, limiting friction, angle of friction and coefficient of friction. State law of limiting friction. Derive the relation between angle of friction and coefficient of friction.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.5 Work, Energy and power	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Define work energy and power and give their units in various systems. Define KE and PE also give their magnitude. Differentiate between conservative and non-conservative forces. State and verify the principle of conservation of energy. Give examples to demonstrate the uses of the transfer of energy.	1. The distinction between the common uses of the term work, energy and power and its meaning in Physics. 2. Magnetic, gravitation, electric forces (conservative) and frictional force (non-conservative). Conservation of energy i.e. change of KE into PE giving example of falling body. Give the transformation of different forms of energies i.e. PE into KE etc.

Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.6 Gravity and Gravitation	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. State Newton's law of gravitation. Deduce unit and dimension of G. Define acceleration due to gravity and variation of g due to height, depth and rotation of earth (not derivation). Differentiate between mass and weight. State the condition of equilibrium of a body. Differentiate between center of gravity and center of mass.	1. Laws of gravitation and derive the formula 2. $F = GMm/R^2$. Acceleration due to gravity, mass and weight, deriv GM/R^2. 4. The relation between gravitation constant and acceleration due to gravity. The variation of g due to height and depth. Center of mass and center of gravity. Conditions of equilibrium of a body with examples.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.7 Properties of Matter	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Define elasticity, stress, strain and elastic limit on the basis of Hook's law. Define surface tension. Differentiate adhesive and cohesive force. Define viscosity of liquid. Describe how the height of liquid rises in a capillary tube of sufficient and insufficient length.	1. Hook's law and the relation between stress, strain and elasticity of solid material. 2. The property of surface tension of liquid. Adhesive and cohesive forces. The capillary action. Viscosity and fluid movement.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Mechanics	
Sub-unit: 1.8 Hydrostatics	Hrs. theory 6 Hrs. lab

Objectives:	Content:
1. Demonstrate that fluid pressure acts in all directions 2. Explain that liquid pressure is proportional to the depth of the liquid and independent of the shape of the vessel. Define density, relative density and specific gravity of solids and liquids. Explain Pascal's law and Archimedes's principle. Apply Archimedes's principle to determine the specific gravity of various solids and liquids. State the principle of flotation & condition of equilibrium of floating bodies. Explain how aneroid and mercury barometers work Describe how atmospheric pressure affects human body functions..	1. Fluid pressure and determination of the formula $P = \rho gh$. Pascal's law. Density, relative density and specific gravity. Difference between density and specific gravity. Archimedes's principle and its uses. Design equipment to verify Archimedes's principle. The principle of floatation and condition of equilibrium for floating bodies. Atmospheric pressure with examples. 9. Construction and working of Aneroid and Mercury barometers. The effect of air pressure on human body.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Heat	Hrs. theory 18 Hrs. lab
Sub-unit: 2.1 Thermometry	Hrs. theory 3 Hrs. lab
Objectives:	Content:
Define heat and temperature. Distinguish between heat and temperature. Describe the construction, calibration and sensitivity of a liquid thermometer. Explain the operation and use of a thermometer. Determine the lower and upper fixed points of the thermometer. Define different temperature scales (Celsius, Fahrenheit, Reaumer and Kelvin) Convert one temperature scale into another. Use the temperature conversion formula to convert and solve numerical problems related to it	Concept of heat temperature. Explain the construction and working of liquid thermometers and determine two fixed points. Demonstrate various types of thermometers and explain their uses. Derivation of the formula $C/5 = [F - 32]/9 = R/4 = [K - 273]$ Relation between different temperature scales.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.

Course: Physics	
Unit: Heat	
Sub-unit: 2.2 Expansion	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Describe linear, superficial and cubical expansion of solids and their expansivity. State the relation between linear, superficial and cubical expansivity of solids (not derivation) Define real and apparent expansion of liquid. Explain the change in density of a substance with the variation temperature. Discuss the density variation of water with temperature (anomalous properties of water). Discuss the concept of water therapy due to high specific heat capacity of water.	1. Linear, superficial and cubical expansion of solids. The relations $l_2 = l_1[1 + \alpha(\theta_2 - \theta_1)]$, $A_2 = A_1[1 + \beta(\theta_2 - \theta_1)]$, $V_2 = V_1[1 + \gamma(\theta_2 - \theta_1)]$ Concept of $\gamma = 3\alpha$ and $\beta = 2\alpha$. Apparent and real expansion of a liquid. Change in density of an object due to change in temperature. Anomalous expansion of water and its importance to marine life. Why water is used for cooling and heating purposes.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Heat	
Sub-unit: 2.3 Heat Capacity	Hrs. theory 3 Hrs. lab
Objectives:	Content:
Define heat capacity, specific heat capacity. Distinguish between joule and calorie as heat unit. Understand the quantity of heat content of a body $Q = ms\theta$. Explain the energy required to cause a phase change at constant temperature. Define freezing, melting and boiling point of a substance Explain latent heat of fusion and latent heat of vaporisation. Discuss the effect of pressure on melting and boiling point of the substance.	Heat capacity, specific heat capacity. Give the relation between joule and calorie. Melting point, boiling point and freezing point of a substance. The effect of pressure on melting and boiling point of substance
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	

Unit: Heat	
Sub-unit: 2.4 Hygrometry	Hrs. theory 4 Hrs. lab
Objectives:	Content:
Define saturated and unsaturated vapours. Differentiate between SVP and USVP. Draw P-V and P-T diagrams and explain the behaviours of vapours. Discuss the effect of pressure and altitude on the boiling point of a liquid. Plot a phase diagram for the substance (H_2O, CO_2) and interpret the ice line, steam line and Hoarfrost line. Explain the triple point (H_2O and CO_2). Explain the term due point, absolute humidity and relative humidity. Demonstrate the wet and dry bulb hygrometer and describe its use to determine the relative humidity	1 Learner will become knowledgeable about: Saturated and unsaturated vapours. Saturated VP and unsaturated VP. P-V and P-T diagrams and explain the behaviours of vapours. The effect of pressure and altitude on the boiling point of a liquid. Use and interpretation of a plot phase diagram for a substance (H_2O, CO_2). The triple point (H_2O and CO_2). The terms due point, absolute humidity and relative humidity. $R_H = \frac{\text{Partial vapour pressure of water}}{\text{vapour pressure of water}} \times 100$ Wet and dry bulb hygrometer and relative humidity.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Heat	
Sub-unit: 2.5 Thermal Conductivity	Hrs. theory 3 Hrs. lab
Objectives:	Content:
Differentiate between conduction, convection and radiation. Define thermal conductivity with its unit and dimension. Distinguish between good and bad conductors of heat. Define black body and black body radiation. Explain transmission of heat by conduction convection and radiation with appropriate application to medical field and daily use. Define emissive power, absorptive power and perfect black body. State the Stefan Boltzmann law and give an example of its application. Describe medical uses of thermal radiation.	1. The transfer of heat by conduction, convection and radiation. 2. Thermal conductivity giving their dimension and units. 3. How one can make perfect in practice. 4. Theory of heat exchange. 5. Laws of black body radiation. 6. Medical uses of heat exchange.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.

Course: Physics	Hrs. theory	Hrs. lab
Unit: 3 Light	Hrs. theory 15	Hrs. lab
Sub-unit: 3.1 Reflection of light	Hrs. theory 5	Hrs. lab
Objectives:	Content:	
Explain the laws of reflection of light. Find the deviation of light by plane mirror as rotating mirror. Distinguish between real and virtual image. Show that in plane mirror object distance = image distance. Define the terms pole, center of curvature, radius of curvature, principal focus, principal axis, focal length. Show that r = 2f for spherical mirrors. Draw ray diagrams to solve problems involving spherical mirrors. Derive the formula $\frac{1}{u}+\frac{1}{v}=\frac{1}{f}$	1. The phenomenon of reflection and hence state the laws of reflection of light. 2. Principles of reflection of light - a. The rotation of mirror through angle θ the reflected ray is rotated through 2θ. b. Object distance is just equal to image distance i.e. u = v but the image is virtual. Real and virtual image. Image formation of spherical mirror. How to correct sign for the focal length, object distance and image distance. The relation, r = 2f, $\frac{1}{u}+\frac{1}{v}=\frac{1}{f}$ and I/O = v/u = m for mirrors. 7. Nature, size and position of the image formed by spherical mirrors at various positions of the object distance on the principal axis.	
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.	
Course: Physics		
Unit: Light		
Sub-unit: 3.2 Refraction	Hrs. theory 6	Hrs. lab
Objectives:	Content:	
1. State and explain the laws of refraction of light. Verify the laws of refraction of light and define refractive index in different media. Derive the expression for apparent depth and lateral shift in a glass slab. Define critical angle and total internal reflection. Explain the phenomenon of total internal reflection. Explain the passage of light rays through a prism. Define the formula i + e = A + δ and ($A = r_1 + r_2$) Define minimum deviation and derive the formula $\mu = \sin[(A + \delta_m)/2]/\sin(A/2)$ Define the terms convex lens, image in lens,	1. Phenomenon of refraction. Refractive index in terms of the speed of light in vacuum to the speed of light in medium. The relations ${}_a\mu^g \times {}_g\mu^w \times {}_w\mu^a = 1$. Refractive index in terms of real depth and apparent depth. The relation $d = t(1 - 1/\mu)$ and lateral shift $p = t[\sin(i - r)]/\cos(r)$. Derivation of the formula $\mu = 1/\sin(C)$ Critical angle and conditions for total internal reflection. Examples of total internal phenomenon, mirage, light pipe. Ray box to demonstrate the deviation of light ray in prism. The formula A + δ = i + e and	

optical center, and thin lens. Draw a ray diagram to locate positions of image in thin lenses (concave and convex). Derive lens formula and lens maker's formula.	$\mu = \sin[(A + \delta_m)/2]/\sin(A/2)$ Uses of different types of lenses. Converging aspect of convex lens and diverging aspect of concave lens. Ray box to demonstrate image formation by convex as well as concave lens. Lens formula and lens maker's formula.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Light	
Sub-unit: 3.3 Optical Instrument	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Draw a labeled diagram of human eye. Explain the eye as an instrument, which forms a sharp image on the retina. Explain the terms far point, near point, and least distance of distinct vision. Define the terms visual angle and angular magnification. Explain the technique of removing the defect of vision. Trace the path of rays through simple and compound microscopes. Explain how white light is a combination of seven different colours, easily decomposed into its components. Understand that refractive index varies with colours. Demonstrate the dispersion of light by prism.	1 Structure of human eye with diagram. 2. The "model eye". Ray diagram to explain the correction of defect of vision. Use of simple and compound microscopes. Calculation of the magnifying power of simple and compound microscopes. Dispersion of light by prism. Dispersion due to variation of refractive index with colours
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	Hrs. theory Hrs. lab
Unit: 4 Waves and Sound	Hrs. theory 8 Hrs. lab
Sub-unit: 4.1 Waves	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Define transverse, longitudinal, progressive and stationary waves with examples. Define amplitude, wavelength, frequency,	1. Mathematical relation, $y = A \sin[\omega t - kx]$. 2. Analytical relation, $y = 2A \sin \omega t \cos kx$ and interpret different terms in the

period and velocity of the wave. Describe how a wave carries only energy from one point to another and no material particle is transmitted in the wave motion. Derive the progressive wave equation. Derive the stationary wave equation. Explain the principle of superposition of waves. Show that a wave undergoes reflection, refraction, interference and diffraction phenomenon.	equation. Superposition of waves. Reflection, refraction, diffraction, and interference of waves.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Waves and Sounds	
Sub-unit: 4.2 Characteristics of Sound Waves	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Differentiate between noise and music. Explain the characteristic of musical sound. Define the terms sonic (audible), infrasonic, ultrasonic and super sound. Define beats and derive beats formula using superposition of waves. Describe how intensity of sound is proportional to the square of amplitude. Define intensity level, bel and decibel. Explain the threshold of hearing and threshold of pain. Explain production of ultrasonic waves and its medical uses.	1. The characteristics of sound i.e. note, pitch, intensity, loudness and timber. Qualitative relations of pitch with frequency, intensity with loudness and overtones with quality of sound. 3. Beat and beat frequency. 4. Intensity level in terms of decibel. Threshold of hearing and threshold of pain. 6. Production of ultrasonic wave and its medical uses.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Light	
Sub-unit: 4.3 Sound Waves	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Explain the evidence that sound waves in air are longitudinal waves. 2. Explain how air undergoes compression and rarefaction as sound waves travels through the air.	1. Sound wave transmission in air. The modification of Newton's formula and establishment of Laplace's formula. Effects of pressure, temperature, density and humidity on the velocity of sound.

3. Derive the formula for the velocity of sound in a medium. 4 Derive Newton's formula for the velocity of sound in air. 5 Explain Laplace's modification of Newton's formula. 6. Explain that sound waves travel under adiabatic condition. 7. Discuss the effect of temperature, pressure, humidity, and density on the velocity of sound.	
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	Hrs. theory Hrs. lab
Unit: 5 Electrostatics	Hrs. theory 10 Hrs. lab
Sub-unit: 5.1 Fundamentals of electrostatics	Hrs. theory 5 Hrs. lab
Objectives:	Content:
Explain the properties of electrical charges. Distinguish between conductor, insulator, and semiconductor. Use a Gold-leaf electroscope. Explain the phenomenon of charging by friction, conduction and induction. Investigate electrostatic phenomenon by Faraday's ice-pail experiment. Charge a Gold-leaf electroscope by induction. Describe the surface charge density on various conductors	Charges and their behaviour. Electrification by friction, conduction and induction on the basis of modern theory. Construction, workings and use of a Gold-leaf electroscope. Process of charging of Gold-leaf electroscope. Faraday's ice-pail experiment. Surface charge density.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: 5 Electrostatics	
Sub-unit: 5.2 Electrostatic Field	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. State and explain Coulomb's law. 2. Explain the properties of lines of force 3. Define electric field and electric flux. 4. Calculate electric field intensity due several point charges. 5. Define electric potential difference,	1. Coulomb's law for point charges and derivation of the expression for force. 2. Effects of permittivity on a medium between two point charges. 3. Electric field and normal electric flux.

potential energy and electron volt. 6. Concept about the equipotential surface. 7. Derive the relation between potential gradient and electric field.	4. Potential and potential energy. 5. Analogy between electric potential and gravitational potential. Electron volt and its use. Equipotential surfaces and electrostatic shielding. Relation between the potential gradient and electric field intensity.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: 6 Magnetism	Hrs. theory 10 Hrs. lab
Sub-unit: 6.1 Fundamentals of Magnetism	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Explain magnetic field strength, lines of force, magnetic field intensity, permeability, and susceptibility. 2. State Coulomb's law for magnetism. 3. Describe the properties of a magnet. 4 Calculate magnetic field intensity due to a bar magnet at any point on the equatorial and axial line of a bar magnet. 5. Trace the lines of force and describe their properties. 6. Define neutral point. 7. Discuss methods of magnetisation and demagnetisation.	1. Like pole repel and unlike pole attract to each other. 2. Various types of magnets and their positions of poles. 3. Coulomb's law for magnetism. 4. Magnetic field intensity due to bar magnet at (a) end on position (b) broad side on position. Lines of force around a bar magnet and the neutral point. Uniform and nonuniform magnetic field. 7. The process of magnetisation (electric and friction) of magnetic materials and their demagnetisation.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Magnetism	
Sub-unit: 6.2 Terrestrial Magnetism	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Describe the dip, declination, and horizontal components of earth's magnetic field. 2. Explain the variation of dip, declination and horizontal components on the earth's surface.	1. Dip, declination, horizontal and vertical components of earth's magnetic field. 2. Dip circles and use it to determine the values of dip at a place. 3. Variation of magnetic elements of the

Define and give the properties of dia, para and ferromagnetic materials. Define and draw the hysteresis curve. Define the terms coresivity, retentivity.	earth's magnetic field at a place. Properties of dia, para and ferromagnetic materials. The hysteresis loss and use of magnetic materials.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: 7 Current Electricity	Hrs. theory 16 Hrs. lab
Sub-unit: 7.1 Electric current	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Discuss current as the rate of flow of charge. State and verify Ohm's law. Define resistance and resistivity. List the factors that influence resistance of a conductor. Distinguish between Ohmic and non-Ohmic conductors. Find the equivalent resistance from the series and parallel combination of resistors. Perform the conversion of galvanometer into voltmeter and ammeter.	1. Current as the rate of flow charge. 2. Potential difference. 3. Ohm's law and its verification. 4. Expression $R = R_1 + R_2 + R_3 +$ …and $1/R = 1/R_1 + 1/R_2 + 1/R_3 +$ ….. in series and parallel combination. Conversion of a galvanometer into ammeter and voltmeter. Ohmic and non-Ohmic conductors from I-V curve. Various types of electrical circuits.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Current Electricity	
Sub-unit: 7.2 Resistance and heat	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. State and explain Joule's laws of heating. Distinguish between potential difference and emf. Relate emf, terminal potential and internal resistance. Derive the equivalent emf from series, parallel and mixed groupings of cells. Define Joule's conversion factor.	1. Joule's laws of heating and derivation of the equation: $H = i^2Rt/J$ Heat production in resistance wire due to passage of current. Electric power in terms of energy dissipated in a time in the resistance wire. Meaning of emf and internal resistance of a cell. Relation $E = V + Ir$. Purpose of grouping of cells to find

	maximum current and maximum voltage. Electric power, watt, kilowatt, kilowatt-hour and horsepower. Meaning of Joule's conversion factor.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Current electricity	
Sub-unit: 7.3 Chemical effect of current	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Explain the term electrolysis, electrolyte, electrodes (cathode and anode) and ions. Explain electrochemical equivalent of the elements. Explain Faraday's laws of electrolysis and experimental verification. Define Faraday's constant. Explain the thermocouple principle. Explain Seebeck and Peltier effect. Discuss the variation of thermo emf with temperature and define neutral temperature and temperature of inversion. Define thermoelectric series.	1. Faraday's laws of electrolysis and the method of its verification. Faraday's constant and electro chemical equivalent. Thermocouple, Seebeck and Peltier effect. Phenomenon of variation of thermoelectric current and emf with temperature. Terms, neutral point and temperature of inversion. Concept about thermoelectric series.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Current Electricity	
Sub-unit: 7.4 Alternating Current	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Describe alternating current (AC) and its interpretation. Relate rms and mean value of current and voltage with its peak value. Appreciate that ac meters measures rms values only. Explain the working of a transformer and its losses. Describe step up and step down transformers. Define stabilized voltage. State and explain Faraday's laws of	1. AC and DC. Importance of AC over DC. Expressions i_{rms}, v_{rms} and i_{mean}, v_{mean} with peak value. Workings of a transformer and energy loss mechanisms in transformers. Faraday's law of electromagnetic induction. Coefficient of self and mutual inductance.

electromagnetic induction.	
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: 8Modern Physics	Hrs. theory 20 Hrs. lab
Sub-unit: 8.1 Electron	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Explain the particle nature of electricity. Discuss the various phenomena observed inside the discharge tube at various pressures. Explain why discharge ceases at very low pressure. Discuss the nature, production and properties of cathode rays. Review the motion of electrons in electric and magnetic fields.	1. Particle nature of electricity. Electric discharge through gas at low pressure. Production and properties of cathode rays. Moving electrons in electric and magnetic fields. Specific charge of an electron.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Modern Physics	
Sub-unit: 8.2 Photoelectric	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Define the terms photoelectric effect, photon, wave function, threshold frequency and stopping potential. Explain photoelectric effect on the basis of the quantum theory of radiation. Draw a photoelectric circuit. State and verify Einstein's photoelectric equation. Give the application of photoelectric effect (photocell, photochemical reaction, photographic plate).	1. Photoelectric effect. Quantum theory of radiation. Einstein's photoelectric equation $h\nu = \phi + \frac{1}{2} mv^2$ and interpretation. Workings of photocells Light on photographic plate and photochemical reaction.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Modern Physics	

Sub-unit: 8.3 X-ray	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Draw well labeled diagram of modern x-ray tube. Explain the production mechanism of x-rays. Discuss the properties of x-rays. Explain the crystal diffraction of x-rays. Derive Bragg's law and use it to determine the crystal plane spacing.	1. Production, nature and use of x-rays. Property of x-rays. Bragg's law, $n\lambda = 2d \sin\theta$. Various uses of x-rays.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Modern physics	
Sub-unit: 8.4 Radioactivity	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Explain the difference between natural and artificial radioactivity. List the main properties of α, β and γ radiation. Explain why these forms of radiation have energy on the order of mega electron voltage. Derive the equations for the laws of radioactivity. Derive the formula that shows that the relationship n between half-life and decay are constant. Graph the decay of radioactivity with time. Explain the principle involved in radio carbon dating.	1. Radioactivity. Properties of α, β and γ radiations. Laws of radioactive disintegration. The constant relationship between half-life and decay. The principle of radio carbon dating and estimation of the age of a fossil. Medical uses of radiation and artificial radioactive nuclei.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Modern physics	
Sub-unit: 8.5 Properties of nucleus	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Describe the constituents of a nucleus. Classify different types of nuclei. Define unified atomic mass units (amu), mass defect, binding energy, binding energy per nucleons, packing fraction.	1. The constituents of nuclei. Isotopes and mass numbers of different elements. Isotope instability. $E = mc^2$ (only qualitatively).

Calculate the mass defect and binding energy of a nucleus. Calculate energy equivalence of mass in joules, eV, and MeV. Explain Einstein's mass-energy relationship theory. Calculate energy released from the decay of radioactive isotopes. Define fission and fusion and calculate the energy released. Discuss the energy released during chain reaction. Discuss health hazards and safety related to radiation.	Fission, fusion and energy released from these nuclear reactions. Radiation hazards and safety.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Unit: Modern physics	
Sub-unit: 8.6 Physics and Society	Hrs. theory 3 Hrs. lab
Objectives:	Content:
1. Describe how our environment is being destroyed due to noise pollution, air pollution and water pollution. Discuss the wide spectrum of electromagnetic radiation from radio waves to cosmic rays. Discuss ozone depletion, greenhouse effect, acid rain. Discuss strategies to reduce pollution at local and national levels.	1. Deteriorating conditions of the environment we live in. Useful and harmful aspects of radiation. Concepts about ozone depletion, greenhouse effect and acid rain. Environmental protection strategies.
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.
Course: Physics	
Practicals	Hrs. theory Hrs. lab 60
Objectives:	Content:
Determine the volume of a hollow cylinder and a solid cylinder using vernier calipers. Determine the volume of a steel ball using a screw gauge. Determine the area of a glass rod using a screw gauge. Verify the laws of reflection of light and find	Application of theory form preceding units.

the relationship between object distance and image distance. Determine the specific gravity of solids dissolved in water. Determine the specific gravity and density of substances lighter than water. Verify laws of refraction and find the refractive index. Determine the upper and lower fixed points of a given thermometer and find the correct temperature of tap water. Find the focal length of a convex lens by the double pin method. Verify the laws of moments of forces and find the weight of a given body. Determine the latent heat of fusion of ice. Determine the magnetic moment and pole-strength of a bar magnet by locating the neutral points, keeping N-pole pointing south, and N-pole pointing north. Verify Ohm's law by using an Ohm meter and volt meter. Demonstrate the variation of lateral displacement with an angle of incidence in a rectangular slab. Determine the refractive index of a prism using the I-D curve method. Verify Archimedes' principle and find the specific gravity and density of solids insoluble in water. Determine the resistance of given wire by meter bridge.	
Evaluation methods: written and viva exams, performance observation.	Teaching / Learning activities and resources: classroom instruction and demonstration, return demonstration, models, solving related problems.

8. Subject: Mathematics, statistics and computer skills.

Hours Theory: 120
Hours Practical: 80
Assessment Marks: 100

Course Description

This course prepares the student to use mathematical Skills necessary for application of medical computations, application of research and statistical interpretations, and for managing the mathematical questions of everyday life. Unit two provides a basic overview of the purpose and process of research, a discussion of scientific process, and principles of research methodology. Additionally, the student applies statistical methods to the interpretation of data related to public health services. Unit three presents basic computer Skills.

Course Objectives

On completion of this course the student will be able to:

Apply mathematical Skills to solve medical problems and interpret research data.
Use vital statistic terminology to discuss public health issues.
Explain the function and value of research.
Describe the process and methodology of research.
Apply mathematical formulas to interpret research data.
Demonstrate the process of report writing.

Recommended Texts

Bajracharya, B.R., et al., Basic Mathematics, Vol. 1. National Book Centre, Kathmandu.
MS-DOS Manual, Microsoft.
MS-Windows Manual, Microsoft.

Course: Mathematics, Statistics & Basic Computer Skills	Hrs. theory 100 Hrs. lab 80
Unit: Mathematics	Hrs. theory 60 Hrs. lab
Sub-unit: 1 Set theory and real number system	Hrs. theory 6 Hrs. lab
Objectives:	Content:
Define and denote sets. Find subsets of a set and represent the sets in venn diagrams. Find the union, intersection, complement and difference of given sets. Solve verbal problems using set operations. Define real numbers, absolute value, open and closed intervals and inequalities. Use the concept of set in selected problems. Define a set and give examples. Make subsets of the set A={1,2,3,4} . Prove that AU(BUC) = (AUB)UC, where A, B, C are any three non-empty subsets. Write the following in set builder form: a) [3, 5] b) [-3, 9]	The concept of sets, specification of sets, representation and types of sets, venn diagrams. Set operation, set of numbers, Cartesian products and relation, domain and range of relation. Real number system and the types of numbers, real numbers line, absolute value, open and closed intervals, inequalities.
Evaluation methods: written assignments to solve related	Teaching / Learning activities and resources:

problems, written examination	Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 2 Function and graph	Hrs. theory 5
Objectives:	Content:
Define a function Classify functions. Identify the different functions. Sketch a graph of the various functions. Sketch a graph of trigonometric function.	Functions and their inverse and related problems. Composite function and related problems. Algebraic, trigonometric, exponential and logarithmic function.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 3 Matrices and determinants	Hrs. theory 6
Objectives:	Content:
Define the term matrix. Write the rows, columns and order of the matrices. Classify matrices according to their properties. Calculate the addition and multiplication of matrices. Define a determinant and list the properties of a determinant. Calculate the minors and cofactors of the determinants (3x3). Calculate the inverse of a matrix.	Definition of matrix, notation order, types of matrices and simple algebra of matrices. Adjoint, inverse of a matrix and related problems. Definition of a determinant, of a determinant's minors, cofactors and properties of determinants.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 4 Equation of a pair of lines	Hrs. theory 5
Objectives:	Content:
Distinguish between homogeneous and non-homogeneous equations. Find the separate equations of the homogeneous equations of second degree. $ax^2 + 2hxy + by^2 = 0$ Find the condition that the non-homogenous equation of second degree ($ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$) may represent a pair of lines and find the separate equations. Prove that the equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of straight lines. Find the conditions that the general equation of second degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ may represent pair of lines. Find the separate equations of the lines represented by $ax^2 + 2nxy + by^2 = 0$.	Non-homogenous and homogenous equations of second degree. Separation of $ax^2 + 2hxy + by^2 = 0$ and solution of related problems. Condition for general equation of second degree $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a pair of lines and related problems.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom

	instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 5 Limits	Hrs. theory 6
Objectives:	Content:
Define the term *limit* and represent it in mathematical form. Evaluate the limiting values of simple algebraic & trigonometric function at the point specified. Use the knowledge in derivative. Explain the meaning of right hand limit and left hand limit. Explain the condition for the existence of limit of any given function at a given point. Evaluate: $\lim_{x \to 2} \frac{x^2 - 4}{x - 2}$	Meaning notation and fundamental theorems on limits. Evaluation of limits, involving simple algebraic and trigonometric functions. Solution of problems related to limits.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics 6	
Sub-unit: 6 Derivatives and their Applications	Hrs. theory 6
Objectives:	Content:
Define the term derivatives. Find the derivative of the functions x^n, $(ax + b)^n$, $\sin(ax + b)$, $\cos(ax + b)$, e^x, $\log x$ by first principle. Find the derivatives of functions using the sum, difference, product, quotient, chain. Use the concept of derivative for finding the maximum and minimum values of the function. Problem application: Suppose that "t" hours after a drug is administered to a patient, the concentration of the drug in the body {K(t)} is given by K (t) = 2t. How long after the drug has been administered does the drug concentration reach the maximum?	Principles of derivatives from first principle Find the differential coefficient of functions x^n, $(ax + b)^n$, $\sin(ax + b)$ e^x, $\log x$ by first principle Derivatives of parametric and implicit functions and related problems. Maximum and minimum of simple algebraic functions.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 7 Antiderivatives	Hrs. theory 9
Objectives:	Content:
Integrate the given function using the inverse process of differentiation Describe the proof that an integral is a limit of a sum.	Concept of antiderivitives. Techniques of integration. Antiderivatives by substitution method.

Find the definite integral of given functions.	Integration by parts. Definite integral.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 8 Permutation and combination	Hrs. theory 9
Objectives:	Content:
Describe the basic counting principle. Find the permutation of n- objects taken "r" at a time. Find the circular permutation of the given objects. Find the combination of n- objects taken "t" at a time when all objects are different. Find the combination of n- objects taken "t" at a time when all objects are the same. Define permutation and combination of a set of objects. Prove the relation C(n, r) = C (n, n-r) Problem application: In how many ways can 4 students be seated in a circular arrangement of chairs?	Introduction of basic counting principle Definition of permutation Formula for finding permutation of n – objects taken r at a time. Application of formula in related problems. Concept of circular permutation Permutation of repeated use of same objects in an arrangement. Meaning of combination. Derivation of formula of combination. Proofs of the relation: c(n,r) = c(n,n-r) c(n,r)+c(n,r-1)=c(n+1,r)
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 9 Binomial series	Hrs. theory 5
Objectives:	Content:
Explain the concept of binomial expression. Prove the binomial theorem. Find the general term, middle term and any particular term in a binomial expansion. Write the coefficients of any particular term of binomial expansion. Solve the following problems: Expand : $(3x + 2)^5$ Find the middle term of $(x^2 + 1/x)^{12}$ Expand and simplify : $1 + \sqrt{x})^4 + (1- \sqrt{x})^4$	Basic concept of binomial series. Binomial expansion for positive integral prove. General and particular terms. Properties of binomial coefficients.
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Mathematics	
Sub-unit: 10 Probability	Hrs. theory 5
Objectives:	Content:
Give the meaning and definition of probability Define the terms: sample, space, equality, mutually exclusive events.	Principles of probability. Deformation (classical and empirical) Computation of probability of the event using

Define independent and dependent events. prove and use addition and multiplication theorem of probability. Explain and use binomial probability distribution. Find the probability of events under given conditions. Problem application: A coin is tossed successively three times. Determine the probability of getting exactly two heads.	definition Use of empirical and frequency distribution of probability of specific causes. Addition (multiplication theorems) Use of odd combination in probability . Binomial probability distribution $P(r) = c(n, r)\, p^r q^{n-r.}$
Evaluation methods: written assignments to solve related problems, written examination	Teaching / Learning activities and resources: Charts, models, graph boards, diagrams classroom instruction, teacher led discussion, demonstration of solutions, illustration through practical examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	Hrs. theory 60
Sub-unit: Introduction to Statistics	Hrs. theory 4
Objectives:	Content:
State the definitions of statistics as given by different writers. Discuss the history of the study of statistics. Explain the purposes and benefits of statistical measurements. Describe the utility and limitations of statistics. Enumerate the different branches of statistics.	Definitions by Horace Secrist & Croxton & Crowden. History of statistics Importance of statistics Utility and limitation of statistics Branches of statistics.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, instruction, textbook self-study, application of statistical methods.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	
Sub-unit: Collection, Classification and Tabulation	Hrs. theory 5
Objectives:	Content:
Describe the processes of data collection, classification and tabulation. Differentiate between primary and secondary data. Identify examples of sources of primary and secondary data Classify given statistical data or information. Prepare a frequency table using the given data Demonstrate proof of the frequency table.	Classification and tabulation of data Differences between primary and secondary data Sources of primary and secondary data Application of primary and secondary data. Application of a frequency table.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	
Sub-unit: Measure of dispersion	Hrs. theory 8
Objectives:	Content:
Define measure of dispersion. Calculate range, mean deviation (using mean, median and mode), quartile deviation, standard deviation (S.D.) and their coefficients. Use Lorenz's curve to find the variability of two	Measures of location. Tools of dispersion. Graphical solutions of coefficients of variation (C.V.) σ & σ^2

series. Compute mean deviation from $\bar{X}$, M_d , M_o and their coefficients. Compute variance and coefficient of variation. Calculate the difference between σ & σ^2	
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	
Sub-unit: Correlation Coefficient	Hrs. theory 9
Objectives:	Content:
Define the concept of correlation. Calculate the correlation coefficient between two variables. Explain the principles behind scarlet diagram. Differentiate between partial and multiple correlation. Determine the values of probable error and standard error for given examples. Differentiate between simple, partial and multiple correlation.	Definition of simple, partial and multiple correlation Finding the range of correlation. Principles of scarlet diagram. Probable error and standard error. Distinction between simple, partial and multiple correlation.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	
Sub-unit: Vital statistics	Hrs. theory 10
Objectives:	Content:
Define the term vital statistics. Describe the methods of measuring vital statistics. Identify the different sources of vital statistics. Describe how to measure morbidity. Define mortality rate. Calculate infant mortality rate from given data. Demonstrate how to find the fertility rate from given data. Calculate the crude birth rate, specific birth rate, and general fertility rate from given data. Determine these rates for Nepal.	Definition of vital statistics. Definition sources of vital statistics. Measurement of morbidity. Infant mortality rate, fertility rate, and general fertility rate. National rates.
Evaluation methods: Written exam, viva.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	
Sub-unit: Research methodology	Hrs. theory 10
Objectives:	Content:
Define the concept of research. Explain the scientific method and give an example. Explain why the scientific method is used in research. Describe the process and methodology of research. Discuss the importance of interpreting research data correctly.	Definition of research Research methodology. Steps of research. Scientific method . Statistical tools for measuring reliability of results. Interpreting and understanding research data.

Describe and demonstrate the statistical tools for measuring the reliability of research results.	
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Elementary Statistics	
Sub-unit: Introduction to Report Writing	Hrs. theory 10
Objectives:	Content:
Describe the purposes and goals of report writing. Discuss the significance of research reporting in scientific study. Identify the steps of report writing. Describe research methodology. Define the term: research problem. Describe the steps required for research process. Discuss the uses of research methodology in medical science.	Definition, purposes and goals of research reports. Significance of research reporting Research methodology Research problems. Steps involved in the process of research. Applications of research in medical science.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Basic Computer Skills	Hrs. theory Hrs. lab 60
Sub-unit: Introduction	Hrs. theory Hrs. lab 12
Objectives:	Content:
Describe the functions and uses of computers. Relate the historical events which led to the development of the computer. Differentiate among the different types and generations of computers.	Definitions and descriptions of computers and computing activities. Historical events in computer development. Characteristics of various types and generations of computers.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Basic Computer Skills	
Sub-unit: Computer systems	Hrs. theory Hrs. lab 12
Objectives:	Content:
Compare and contrast the functions of your computer hardware. Describe and demonstrate the functions of your computer hardware. Describe and demonstrate the functions of computer memory and storage systems.	Computer hardware: CPU, VDU, Input and Output peripherals. Computer software: systems, applications, and utility software. Memory: RAM, ROM; storage systems (magnetic, optical), storage types (floppy, hard disk, compact disk), and storage capacities.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Basic Computer Skills	

Sub-unit: Operating systems	Hrs. theory Hrs. lab 12
Objectives:	Content:
Describe the important uses of operating systems. Explain the application of selected operating systems: MS-DOS, Windows, UNIX. Demonstrate the uses of file management systems and directories. Demonstrate creating and removing subdirectories, assigning attributes, and saving and retrieving files. Describe internal and external commands and demonstrate their uses. Explain the functions of system files: COMMAND.COM., AUTOEXEC.BAT, CONFIG.SYS.	Functions of operating systems. Applications of operating systems. File management systems and directories. Subdirectories, attributes, saving and retrieving files. Internal and external commands. Functions of system files.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Basic Computer Skills	
Sub-unit: Program application	Hrs. theory Hrs. lab 12
Objectives:	Content:
Describe the uses of the MS-Windows based word processing package. Demonstrate the application of the DOS text editor and Windows word processing package to edit and format documents. Demonstrate the application of the DOS text editor and Windows spread sheet package to create a chart and edit a worksheet. Create a simple presentation using the PowerPoint program.	MS-Windows word processing, DOS text editor, formatting documents. Application of the spread sheet package (MS-Excel) Application of a data base package (MS Access) Application of MS PowerPoint program.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.
Course: Mathematics, Statistics & Basic Computer Skills	
Unit: Basic Computer Skills	
Sub-unit: System utilities	Hrs. theory Hrs. lab 12
Objectives:	Content:
Demonstrate the procedure for scanning the viruses and removing viruses. Use a virus protection utility to recover damaged files in a diskette or hard disk.	Utilities for virus protection. Operation of virus utilities.
Evaluation methods: Written, viva exams.	Teaching / Learning activities and resources: classroom discussion, textbook self-study, application of process to given examples.

9. Subject: Himali (Lama) language

Total Hours: 156
Marks: 100
Nature: Theory

Description:

This subject is divided into 14 units related to the skills and knowledge on letters and sounds, affixes, seven distinctions, letter writing, attendance, discussion, Buddhist chittra, poetry, spelling and pronunciation, letters to be repeated, seven positions satisfying, writing, speaking and reading skills if/in Himali (Lama) language respectively with a view to make the trainees' ability to read, write and speak. The skills and knowledge stored in the Amchi medical texts written in Himali (Lama) language.

Objectives:

1. To write/speak letters and sounds (Vowels and consonants) of Himali language.
2. To write/speak/make use of affixes to form word of Himali (Lama) language.
3. To identify/explain/use seven distinctions of Himali (Lama) language.
4. To write various types of letters in Himali (Lama) language.
5. To discuss on the given topics in Himali (Lama) language.
6. To write/recite poetry in Himali (Lama) language.
7. To perform pronunciation/spelling of words in Himali (Lama) language.
8. To practise various types of writings in Himali (Lama) language.
9. To practise speaking in Himali (Lama) language.
10. To practise reading various printed materials in Himali (Lama) language.

Contents:

Unit I : Letters, vowels and consonants: 7 hrs.

1. Introduction
2. Thirty consonants
3. Four vowels
4. Twelve ra-go: the twelve basic consonants with "r" on their head.
5. La-go-ten: ten basic consonants with the letter "L" surmounting them.
6. Eleven s-go: the eleven basic consonants with the letter "S" surmounting them.
7. Ra-tag thirteen: the thirteen basic consonants to which the letter "Y" is subjoined.
8. Six La-tag: the six basic consonants to which the letter "L" is subjoined.

Unit II: Prefixes and suffixes: 7 hrs.

1. Five ngon-jug: five prefixes.
2. Je-jug ten: ten affixes
3. Male letter
4. Female letter
5. Neutral letter
6. Poorest female letter
7. Types of male and female affixes.
8. Male: excellent, good and poor
9. Female: very acute

Unit III: Seven Distinctions **7 hrs.**

1. Like noun
2. The dative case, the second case of Himali grammar
3. The instrumental particles
4. Needed reasons
5. Sources
6. Possession
7. Place, locality

Unit IV: Letter writing **7 hrs.**

1. Types of letter writing
2. Letters of high level person in the village
3. Letters with polite words
4. Letters asking about health
5. About oneself, friend and others
6. Letter describing present situation
7. Letter with praying
8. Monthly and daily letters

Unit V: Attendance **5 hrs.**

Unit VI: Discussion (Questioning between teacher and student) **7 hrs.**

Unit VII: Practice on Buddhist Chittra **20 hrs.**

Unit VIII: Write poetry or recite other poets' poems **7 hrs.**

Unit IX: Spelling and pronunciation **10 hrs.**

1. Pronunciation of "NI"
2. Pronunciation of "DNG"
3. Pronunciation of "DI"
4. Pronunciation of "Gang"
5. Pronunciation of "Dak"
6. Pronunciation of "Guk"

Unit X: The eleven letters which are replicated when join with a terminal **7 hrs.**

Unit XI: The seven position signifying to or at, with the use of four vowels, sources and how to call them. **7 hrs.**

Unit XII: Writing skills/Practices: **45 hrs.**

Writing practice in Tibati (Lama) language about the following:

1. Words, sentences, paragraph, essays and poems.
2. Abstract, conclusion/summary and introduction.
3. Acknowledgement, process and situation explanations.
4. Reports: General specific (Technical, research, evaluation/supervision, field visits and health programs).
5. Notes: Making and taking notes.
6. Questions and answers: making and writing questions and answers.

7. Proposal: general, specific (technical, financial, community health service programs).
8. Articles, bio-data, bio/autobiography and daily diary.

Unit XIII: Spelling skills/Practice: 20 hrs.

Practising to speak and spell the following in Tibati (Lama) language.

1. Sounds and pronunciation
2. Words
3. Sentences: long and short
4. Conversation
5. Communication

Unit XIV: Reading skill/practice: 10 hrs.

1. Letters, books, technical publications and news paper of Tibati (Lama) language.
2. Tibati Medical texts.

24. Subjects:

b) Second year:

1. Root Tantra
2. Explanatory Tantra – I
3. Quintessential Tantra – I
4. Last Tantra – I
5. Environmental Health (*Same as P.C. Health Science, Second year)*
6. Health Education (*Same as P.C. Health Science, Second year)*
7. Health management. (*Same as P.C. Health Science, Third year)*
8. Social studies (*Same as P.C. Health Science, First year)*

1. Subject: Root Tantra

Hours:		**Marks:**
Theory:	**120**	**Theory: 50**
Practical:	**80**	**Practical: 50**
Total:	**200**	**Total: 100**

Description:

This is an introductory course on root tantra of Amchi medicine and divided into different units and sub-units. The first unit contains the original (Mandala) basis of discourse on medicine, the five excellences of dharma, period, teacher, abode and retinue. The second unit contains the subject of discourse of the rGyud- bzhi. Third unit contains the basis of mind-body in dynamic equilibrium and disequilibrium representing healthy and diseased body. The fourth unit contains the diagnosis of symptoms of the disorders. The fifth unit contains therapeutic methods concerning diet, behavior, medicines and accessory therapies. The sixth unit contains the synopsis of root tantra into an illustrated medicinal tree.

Objectives:

1. To develop skills/knowledge on the basis of discourse on Amchi medicine
2. To enumerate the subject of discourse on Amchi medicine .
3. To differentiate healthy body from diseased body.
4. To demonstrate various diagnostic methods of Amchi medicine.
5. To identify symptoms of various disorders.
6. To demonstrate therapeutic methods of Amchi medicine concerning diet, behavior, medication and accessory therapies.
7. To synopsize Root Tantra into illustrated medicinal tree (allegorical tree) concerning the roots of etiology, diagnosis and therapeutics.
8. To apply the skills and knowledge acquired through this subject towards the quality human health services.

Unit I: The basis of discourse on Medicine (15 hrs.)

Sub unit I: General lineage: Introduction

1. Omniscient padmapani (Dalai Lama).
2. Sugata sunamaparikirtana, the glorious.
3. Sugata svaraghosaraja (Ratnacandraraja).
4. Sugata suvarnabhadravimala, the glorious.
5. Tathagata Asokottama.
6. Sugata Dharmakirtisagaraghosa.
7. Sugata Abhijnaraja, knower of three times.
8. Sugata Sakyaketu, “omniscient and supreme guide”.
9. Bhaisajyaguruvaiduyaprabha.
10. Hermit sage Vidyajnana, emanation of Buddha-mind.
11. Hermit sage Vidyajnana, emanation of Buddha-body.
12. Hermit sage Vidyajnana, emanation of Buddha-attributes.

Sub unit II: Various Retinue: Introduction

1. Retinue of Gods: four Retinue of Gods.
2. Retinue of Hermit sages: Twelve retinue of Hermit sages.
3. Retinue of Hindu Gods: Six Retinue of Hindu Gods.
4. Retinue of Buddhist Bodhisattvas and pious attendants: Seven Retinue

Sub unit III: Various Abodes: Introduction

1. The southern Vindhya Mountain
2. The northern Himavant Mountain
3. The eastern Gandhamadana Mountain
4. The western Malaya Mountain

Sub unit IV: The Blue Beryl Treatise: A brief introduction

1. Four Tantras
2. The ornament of the intension of Bhai Sajyaguru, Master of Remedies.
3. The subject of introductory scene.
4. Five excellent conditions of successful teaching
5. Five pristine cognition and their relation to the five sibling hermit sages
    a) Mirror-like pristine cognition which purifies delusion.
    b) The pristine cognition of emptiness which purifies hatred.
    c) The pristine cognition of sameness which purifies pride.
    d) The pristine cognition of discernment which purifies desire.
    e) The pristine cognition of accomplishment which purifies envy.

Unit II: The subject of discourse: Introduction (15 hrs.)

Sub unit I: General Lineage: Introduction

1. Hermit sage Vidyajnana, emanation of Buddha-activities.
2. Hermit sage Manasijna, emanation of Buddha-speech who requests the Tantra.
3. Prajapatidaksa, among the retinue of Gods.
4. The physicians Asvinikumarau, among the retinue of Gods.
5. Indrasakra of the thousand eyes (Sahasraksa), among the retinue of Gods.
6. Amrta (devi) Harati, among the retinue of Gods.
7. Atreya, among the retinue of (Celestial) hermit sages.
8. Agnivesa, among the retinue of (Celestial) hermit sages.
9. Nimindhara, among the retinue of (Celestial) hermit sages.
10. Kasyapa, among the retinue of (Celestial) hermit sages.
11. Carakaparivravjika, among the retinue of (Celestial) hermit sages.
12. Bharadvaja, among the retinue of (Celestial) hermit sages.

Sub unit II: Basis of Root Tantra

1. The teacher and transcendent Lord Bhaisajyaguru.
2. Vidyajnana, the emanation of his Buddha-mind, expounding the Root Tantra.
3. Manasija, the emanation of his Buddha-speech, reverently requests the teacher (Vidyajnana) and his emanational basis of Root Tantra.
4. Manasija performs a ritual circumambulation.
5. Manasija makes obeisance.
6. The root of natural physical condition and the humoural basis of disease.

Unit III: The basis of Mind-Body: Introduction (15 hrs.)

Sub unit I: The body of unmodified physiology: Introduction

A. The humoural basis of disease: Introduction

1. Types of wind/vital energy (Vita; rlung).
    a) Life sustaining breath
    b) Ascending wind - associated with vocal cords.
    c) Pervasive wind – associated with metabolism
    d) Fire-accompanying wind – associated with digestion
    e) Descending purgative wind – associated with excretion and reproduction.

2. Types of bile (Pitta, mkhris-Pa)
    a) Digestive bile
    b) Color- transforming bile – associated with chyle.
    c) Energizing bile.
    d) Vision producing bile.
    e) Complexion clearing bile.

3. Types of Phlegm (Kapha, Bad-Kan)
    a) Supporting phlegm
    b) Decomposing phlegm
    c) Gustatory phlegm
    d) Sensory stimulating phlegm
    e) Adhesive phlegm

B. The body constituents

1. Chyle
2. Blood
3. Muscle tissue and flesh
4. Adipose tissue
5. Bone tissue
6. Marrow tissue
7. Reproductive fluids

C. Impurities

1. Faeces
2. Urine
3. Perspiration

D. Flowers and fruits

1. Flowers symbolizing freedom from disease
2. Flower symbolizing longevity
3. Fruit symbolizing spiritual and mental well-being
4. Fruit symbolizing the obtaining of unsurpassed enlightenment which liberates the psycho-physical components in the body of light, achieving ultimate bliss.

Sub unit II: Pathological transformations : Basic concepts

A. Primary causes of disease

1. Desire
2. Hatred

3. Delusion

B. Secondary causes of disease

1. Time (Dus)
2. Demons (Gdon)
3. Diet (Zas)
4. Conduct or Regimen (Spyod-pa)

C. Areas of inception of disease

1. Defusing the skin
2. Extending through the muscle
3. Moving through the channels
4. Lodging in the bones
5. Descending into the solid viscera
6. Flowing down the hollow viscera

D. Predominant location of the humours

1. Wind: lower part of the body
2. Bile: Middle part of the body
3. Phlegm : Upper part of the body

E. Pathways affected by pathogenic humours

1. Pathways associated with pathogenic wind
    a) Bones of so forth, the bodily constituents in which wind moves.
    b) Ears and so forth, among the sense-organs.
    c) Pores or the seat of sensory contact, among the impurities.
    d) Heart, among the solid viscera.
    e) Large intestine and so forth, among the hollow viscera.

2. Pathways associated with bile
    a) Blood and so forth, the bodily constituents in which bile moves.
    b) Perspiration among the impurities.
    c) Eye and so forth, among the sense organs.
    d) Liver and so forth, among the solid viscera.
    e) Gall bladder and so forth, among the hollow viscera.

3. Pathways associated with phlegm
    a) Chyle and so forth, the bodily constituents in which phlegm moves.
    b) Faeces or urine, among the impurities.
    c) Nose and so forth, among the sense organs.
    d) Lungs and so forth, among the solid viscera.
    e) Stomach and so forth, among the hollow viscera.

F. Rising occasions of the humours

1. Wind arises in old age.
2. Bile arises in adult maturity.
3. Phlegm arises in childhood.
4. Wind arises in cold (Places).
5. Bile arises in dry (and hot places).
6. Phlegm arises in damp (and unctuous places).
7. Wind arises in summer (afternoon and dawn).

8. Bile arises in autumn (and at noon and midnight).
9. Phlegm arises in spring (and in evening and morning).

G. Results which bring fatality

1. Exhaustion of three factors which sustain life : the life span, merit, and the past actions.
2. Fatal (disharmony of the) humoural combination.
3. Compound medications which are lethal because they are identical to the disease in their nature.
4. Affliction of vulnerable points (by pathogenic humours).
5. Wind diseases beyond recovery, which interrupt the life support.
6. Fevers beyond recovery.
7. The depth of cold beyond recovery.
8. Unsustainable body constituents.
9. Extreme injury (caused by elemental demons).

H. Contrary humoural imbalances

1. Wind is tranquillized but there is a contrary humoural imbalance of bile.
2. Wind is tranquillized but there is a contrary humoural imbalance of phlegm.
3. Wind is not tranquillized but there is a contrary humoural imbalance of bile.
4. Wind is not tranquillized but there is a contrary humoural imbalance of phlegm.
5. Bile tranquillized but there is a contrary humoural imbalance of wind.
6. Bile tranquillized but there is a contrary humoural imbalance of phlegm.
7. Bile is not tranquillized but there is a contrary humoural imbalance of wind.
8. Bile is not tranquillized but there is a contrary humoural imbalance of phlegm.
9. Phlegm is tranquillized but there is a contrary humoural imbalance of wind.
10. Phlegm is tranquillized but there is a contrary humoural imbalance of bile.
11. Phlegm is not tranquillized but there is a contrary humoural imbalance of wind.
12. Phlegm is not tranquillized but there is a contrary humoural imbalance of bile.

I. Cold and Hot diseases

1. Diseases with a nature of cold.
2. Diseases with a nature of heat.

Unit IV: Diagnosis and symptoms of disorders: (30 hrs.)

Sub unit I: General lineage: Introduction

A. Retinue of hermit sages

1. Dhan Vantari, among the retinue of (Celestial) hermit sages.
2. Punarvasu (Atreya), among the retinue of (Celestial) hermit sages.
3. Aurabhra, among the additional retinue of (Earthly) sages.
4. Jatukarna, among the additional retinue of (Earthly) hermit sages.
5. Parasara, among the additional retinue of (Earthly) hermit sages.
6. Ksarapani, among the additional retinue of (Earthly) hermit sages.

B. Retinue of Hindu Divinities

1. Ancestor Brahma in the form of Hiranyagarbha, among the Hindu retinue.
2. Mahadeva, among the Hindu retinue.
3. Sadanana Kumara (The "Six-faced prince"), among the Hindu retinue.
4. Ganapati, among the additional Hindu retinue.
5. Parasu Ram, among the additional Hindu retinue.

Sub unit II: Visual Observation

A. Observation of tongue

1. Tongue under the imbalance of wind.
2. Tongue under the imbalance of bile.
3. Tongue under the imbalance of phlegm.

B. Observation of Urine

1. Urine under the imbalance of wind.
2. Urine under the imbalance of bile.
3. Urine under the imbalance of phlegm.

Sub Unit III: Palpation of Pulse

1. Pulse under the imbalance of wind.
2. Pulse indicative of imbalance of wind.
3. Pulse under the imbalance of bile.
4. Pulse indicative of the imbalance of bile.
5. Pulse under the imbalance of phlegm.
6. Pulse indicative of the imbalance of phlegm.

Sub unit IV: Inquiry

A. Inquiry concerning wind: The secondary causes/activating causes, symptoms and beneficial regimen.

1. Secondary causes of wind including diet and conduct - light and harash.
2. Yawning and trembling – symptomatic of diseases caused by wind.
3. Stretching of limbs – symptomatic of diseases caused by wind.
4. Shivering
5. Aching hips, waist, and joints.
6. Acute pains.
7. Nauseous sensation.
8. Dullness of the sense organs.
9. Mental restlessness.
10. An empty stomach which aggravates such symptoms.
11. Oily and nutritious food which alleviates such symptoms.

B. Inquiry concerning bile: The secondary/activating causes, symptoms, and beneficial regimen.

1. Secondary causes of bile including diet and conduct - sharp and hot.
2. Bitter taste in the mouth – symptomatic of diseases caused by bile.
3. Headaches – symptomatic of diseases caused by bile.
4. Fever induced by muscular heat (Symptomatic of diseases caused by bile)
5. Acute pain in the upper part of the body.
6. Periods after digestion (When such symptoms care aggravated).
7. Cool food and drinks which alleviate (Such symptoms).

C. Inquiry concerning phlegm: The secondary/activating causes, symptoms and beneficial regimen for diseases caused by phlegm.

1. Secondary caused of phlegm including diet and conduct – heavy and oily.
2. Loss of appetite – symptomatic of diseases caused by phlegm.
3. Difficult digestion.
4. Vomiting.
5. Loss of taste.
6. Flatulence of the stomach.
7. Eructation.
8. Lethargy of body and mind.
9. External and internal sensation of cold.
10. Periods after meals such symptoms are aggravated.
11. Warmth in diet and conduct which alleviates such symptoms.

Unit V: Therapeutic Methods: Introduction to the methods of Treatment. (30 hrs.)

Sub Unit I: General Linage: Introduction

1. Manjusri kumarabhuta, "Who was once a prince", among the Buddhist retinue.
2. Avalakitesvara, the visitor, among the Buddhist retinue.
3. Vairapani, the ferocious, among the Buddhist retinue.
4. Ananda, the disciplinarian, among the Buddhist retinue.
5. Jivaka Kumaravhrta, the physician, among the Buddhist retinue.
6. Kasyap. Among the additional Buddhist retinue.
7. Upali, among the additional Buddhist retinue.
8. Nagarjunapada, the glorious lord.
9. Mafrcetapadaq, (i.e. Vagbhata), great pandita of five science.
10. Candrabhinandana, mighty scholar of Kashmir.
11. Padmakra, whose kindness is beyond samsara.
12. Vairocana, the great translator.

Sub unit II: Diet: Introduction to Diet therapy.

A. Food suitable for (imbalance of) wind.

1. Horse flesh
2. Donkey flesh
3. Marmot flesh
4. Year old dried meat
5. Grain-seed oils
6. Year old butter
7. Molasses
8. Garlic
9. Onion

B. Beverages suitable for (imbalance of) wind.

1. Fresh warm milk.
2. Ale-stew prepared from angelica/hog fennel and Solomon's seal.
3. Molasses wine
4. Wine made from bones

C. Food suitable for (imbalance of) bile.

1. Curd made of cow and goat milk
2. Butter milk derived from the cow and goat
3. Butter of cow and goat
4. Game including the flesh of all wild ungulates
5. Flesh of hybrid cattle (cross breed)
6. Goat meat
7. Clear unseasonal soup of newly stored barley
8. White (cooked) dandelion.
9. Cooked dandelion

D. Beverages suitable for (imbalance of) bile.

1. Hot water
2. Cold water from glaciers and underground springs
3. Cold boiled water

E. Food suitable for (imbalance of) phlegm.

1. Mutton
2. Wild yak meat
3. Flesh of beasts of prey
4. Fish
5. Honey
6. Warm dough balls of aged barley grain (grown in) dry land

F. Beverages suitable for (imbalance of) phlegm.

1. Curd and butter milk of the dri.
2. Strong wine
3. Warm boiled water

Sub unit III: Conduct: Introduction to behavior therapy

A. Conduct suitable for (imbalance of) wind.

1. Warm location
2. Pleasant friends

B. Conduct suitable for (imbalance of) bile.

1. Cool location
2. Relaxation

C. Conduct suitable for (imbalance of) phlegm.

1. Energetic activity
2. Staying in warm location

Sub unit IV: Medication: Introduction to medication therapy.

A. Tastes of Medications for (imbalance of) wind.

1. Sweet.
2. Sour
3. Salty

B. Potencies of medications for (imbalance of) wind.

1. Oily
2. Heavy
3. Mild

C. Tastes of Medications for (imbalance of) bile.

1. Sweet
2. Bitter
3. Astringent

D. Potencies of Medications for (imbalance of) bile.

1. Cool
2. Thin
3. Dull

E. Tastes of Medications for (imbalance of) phlegm.

1. Pungent
2. Sour
3. Astringent

F. Potency of Medications for (imbalance of) phlegm.

1. Sharp
2. Harash
3. Light

G. Broth: Among the tranquillizing agents mainly for imbalance of wind.

1. Broth of bones
2. Broth of four essences: meat, molasses, butter, and old wine/garlic
3. Broth of strained (Sheep's) head

H. Medicinal butter: Among the tranquillizing agents mainly for imbalance of wind.

1. Medicinal butter based on nutmeg.
2. Medicinal butter based on garlic
3. Medicinal butter based on the three fruits: chebulic, belleric and embellic myrobalan
4. Medicinal butter based on five roots: Soloman's seal, asparagus, angelica or hog fennel, mirabilis himalaica and caltrops.
5. Medicinal butter based on the "great medication": black aconite, Acontinum ferox etal.

I. Decoction: Among the tranquillizing agents mainly for imbalance of bile.

1. Decoction based on elecampane.
2. Decoction based on moonseed.
3. Decoction based on gentian.
4. Decoction based on the three (myrobalan) fruits: Terminalia chebula, Terminalia bellerica, and Phyllantus emblica.

J. Powder: Among the tranquillizing agents mainly for imbalance of bile.

1. Powder based on camphor.
2. Powder based on sandal wood.
3. Powder based on saffron.
4. Powder based on bamboo pith.

K. Pills: Among the tranquillizing agents mainly for imbalance of phlegm.

1. Pills based virulent poison: yellow aconite.
2. Pills based on mineral salt: i.e. halite.

L. Tres-sam Medicinal powders: Among the tranquillizing agents mainly for the imbalance of phlegm.

1. Medicinal powder of pomegranate.
2. Medicinal powder of rhododendron.
3. Medicinal powder of lime/pongamia.
4. Medicinal powder of burnt salt compounds.
5. Medicinal powder of burnt calcite ash.

M. Mild-enemata for imbalance of wind: among the cathartic procedures.

1. Mild procedure for administering enema for wind alone.
2. Cleansing procedure for administering enema for wind and bile: pressure is exerted on the soles of the feet.
3. Cleansing procedure for administering enema for wind and phlegm; in which body is shaken.

N. Purgatives for the imbalance of bile: among the cathartic procedures.

1. General (preparation for administering) purgatives (including bathing).
2. Special purgatives (including the rinsing of mouth).
3. Strong purgatives (including compress).

O. Emetics: for imbalance of phlegm, among the cathartic procedures.

1. Strong emetics.
2. Mild emetics.

Sub unit V: External therapy: Introduction and basic concept.

A. External therapy for imbalance of wind.

1. Massage
2. Mongolian moxibustion

B. External therapy for imbalance of bile.

1. Inducing perspiration.
2. Blood letting.
3. Fomentation including immersion in waterfalls.

C. External therapy for imbalance of phlegm.

1. Compress
2. Moxibustion

Unit VI: Synopsis of Root Tantra: The allegorical tree: (15 hrs.)

1. Synopsis of Root Tantra.
2. Root of etiology
    a) Mind and body in equilibrium
    b) Mind and body in disequilibrium
3. Root of diagnosis
    a) Visual diagnosis
    b) Sphygmology
    c) Interrogation
4. Root of therapeutics
    a) Diet
    b) Behavior

c) Accessory therapies

Practical skills: (80hrs.)

Unit I: Analyze the basis of discourse on Medicine

1. Draw the Mandala
2. Paint the Mandala
3. Enlist the followings:
   - General lineage of four tantras of medical science.
   - Various retinues.
   - Various abodes.
4. Enlist remedies for diseases with nature of hat, cold and their combinations found in four forests of medicine (Mountains) with their
   - Potency
   - Taste
   - Time of collection
   - Uses
   - Part(s) used as medicine
5. Memorize medicinal substances/remedies mentioned in the forests of medicine.

Unit II: Enumerate the subject of discourse

1. Enumerate the subject of discourse
2. Demonstrate the ritual circumambulation.
3. Demonstrate obeisance

Unit III: Identify healthy and diseased state of human body

1. Identify healthy state of body
   a) Enlist fifteen Nyes-pas with their seat, pathways and functions
   b) Enlist seven bodily constituents with their functions.
   c) Enlist three excretions with their function.

2. Identify diseased state of body
   a) Enlist primordial cause of Nyes-Pas.
   b) Enlist immediate cause of Nyes-Pas.
   c) Identify general pathways of Nyes-Pas.
   d) Specify general locations of Nyes-Pas.
   e) Specify specific pathways of Nyes-Pas.
   f) Enumerate conditions favorable for Nyes-Pas.
   g) Identify disorders of fatal effects.
   h) Identify/enlist adverse effects of treatment/Iatrogenesis.
   i) Identify/enlist diseases with a nature of cold and diseases with a nature of heat

3. Differentiate between healthy and diseased states of human body.

Unit IV: Diagnose disorders with their symptoms

1. Perform visual diagnosis
   a) Perform visual diagnosis of rlung tongue enlisting symptoms of disorders.
   b) Perform visual diagnosis of Mkhris-Pa tongue enlisting symptoms of disorders.
   c) Perform visual diagnosis of Bad-Kan tongue enlisting symptoms of disorders.
   d) Perform visual diagnosis of rlung urine listing its symptoms of disorders.

e) Perform visual diagnosis of Mkhris-Pa urine listing symptoms of disorders.
f) Perform visual diagnosis of Bad-Kan urine listing symptoms of disorders.

2 Perform Palpation
a) Diagnose rlung pulse with characteristics.
b) Diagnose Mkhris-Pa pulse with characteristics.
c) Diagnose Bad-Kan pulse with characteristics.

3. Perform interrogation:
a) Carry out rlung interrogation.
b) Carry out Mkhris-Pa interrogation.
c) Carry out Bad-Kan interrogation.

4. Perform examination of patients
a) Examine tongue of patient
b) Examine urine of patient
c) Examine pulse of patient
d) Identify/decide/diagnose disorder(s) of patient
e) Write prescription(s)

Unit V: Apply therapeutic methods to manage disorders

1. Demonstrate the process of the followings:
a) Diet therapy
b) Medication therapy
c) Behavior therapy
d) Accessory therapies as follows
- Moxibustion
- Blood letting
- Compress
- Sweating
- Bath in waterfall

2. Treat common human disorders through:
a) Diet
b) Medication
c) Conduct
d) Moxibustion
e) Sweating
f) Compress
g) Medicinal bath

3. Treat patient:
a) Examine patient
b) Diagnose the disorder(s) of patient
c) Treat patient
d) Suggest/instruct patient
e) Provide follow up suggestions to the patient

4. Apply the skill and knowledge acquired in this subject to provide quality health services to the community.

5. Handle as many cases as possible so as to be competent and confident in handling them.

Unit VI: Illustrate the allegorical tree.

1. Draw the allegorical tree
2. Paint the allegorical tree
3. List number of parts of the allegorical tree as:
   a) Root with their name and numbers
   b) Trunks with their name and numbers
   c) Branches with their name and numbers
   d) Leaves with their name and numbers
   e) Flowers with their name and numbers
   f) Fruits with their name and numbers
4. Memorize the name and numbers of the parts of allegorical tree.
5. Demonstrate the application of allegorical tree.

2. Subject: Explanatory Tantra - I

Hours	Marks
Theory: 120	**Theory: 100**
Practical: 160	**Practical: 50**
Total: 280	**Total: 150**

Description:

This subject provides basic knowledge and skills on Embryology; similes of body ; anatomy and physiology; actions and classification of body; signs of death; causes, manner and symptoms of diseases according to Amchi medical science.

Objectives:

1. To identify/illustrate/explain the concept of embryology from conception to the delivery according to the Amchi medical science.
2. To assist in parturition and cutting umbilical cord.
3. To manage sustenance of child and mother by means of correct provisions.
4. To identify/illustrate/explain metaphors for body structure.
5. To measure bodily constituents in a healthy organism.
6. To illustrate/explain the anterior and posterior view of male and female human body.
7. To illustrate/explain the concept of human anatomy according to Amchi medicine.
8. To illustrate/explain basic physiology of mind/body.
9. To classify human body according to Amchi science.
10. To demonstrate/identify sign's of death.
11. To identify primary and secondary causes of disorders.
12. To illustrate the manner of how disease enter human body.
13. To identify/enlist symptoms of diseases.
14. To apply the skills and knowledge acquired through this subject towards the quality human health services.

Unit I: Human Embryology (16 hrs.)

A. Conception:

1. Conception and entry of consciousness:
   a) Conception in the womb, which is dependent on sexual intercourse and which is aroused by past actions and conflicting emotions.
   b) The entry of consciousness into the womb through the preferred method (i.e. the breath of the father's mouth whereby a male body is obtained in accordance with the immediate reaction of attachment (to the mother) and aversion to (the father)

2. Nine kinds of semen or (Uterine) blood.
   a) Semen or (Uterine) blood, defective owing to wind.
   b) Semen or (Uterine) blood, defective owing to bile.
   c) Semen or (Uterine) blood with defective phlegm.
   d) Semen or (Uterine) blood, defective owing to blood.
   e) Semen or (Uterine) blood, defective owing to phlegm and wind.
   f) Semen or (Uterine) blood, defective owing to blood and bile.
   g) Semen or (Uterine) blood, defective owing to wind and bile.

h) Semen or (Uterine) blood, defective owing to the combination of the three humours).
i) Absence of (the five elements) earth, space and so forth.

3. Non-defective semen or (uterine) blood as the primary cause of conception
4. Menstrual discharge (Induced) over a three days period by wind.
5. (Conception on) the first, third, fifth, seventh or ninth day (after) the end of menstruation) produces a male child, as indicated.
6. (Conception on) the second, fourth, six or eight day (after the end of menstruation) indicates that a female child will be born.
7. (On the twelfth day) the (uterine) entrance closes like a lotus at sunset, as indicated.
8. The father's semen generates bone tissue and the brain with spinal cord.
9. The mother's uterine blood generates muscle tissue, blood and the solid and hollow viscera.
10. Origination of the consciousness of the sense organs from (the embryo's) own mind.
11. Origination of muscular and bone tissue, along with nose and its odours from the earth element.
12. Origination of blood, along with the tongue and humidity (which is of the nature of diverse taste) from water.
13. Generation of warmth and clarity of complexion from the fire element.
14. Generation of breath and so forth from the air element.
15. Generation of orifices, the ears and their sounds from space element.
16. Formation of embryo (which ensures) through the conjunction of these primary causes and their secondary causes.
17. The connection of uterus with umbilic and through the right and left channels, whereby development takes place following conception.

B. Development of Embryo/foetus:

1. First week – the mingling of semen and uterine blood.
2. Second week – the clotting (of embryo)
3. Third week – the solidification of the embryo in the manner of the formation of curd.
4. Fourth week – the rounded or oval formation and so forth (of the embryo)
5. Fifth week (Second month) – formation of the umbilic.
6. Sixth week – formation of the channel of life.
7. Seventh week – initial formation of eyes.
8. Eighth week – formation of the shape of the head
9. Ninth week – formation of the shape of the body, upper and lower parts.
   - period of the fish (the embryo is limbless)
10. Tenth week – initial protuberance of the shoulders and hips.
11. Eleventh week – initial shaping of the nine (Orifices of the) sense organs.
12. Twelfth week – initial shaping of the five solid viscera.
13. Thirteenth week – initial appearance of the six hollow viscera.
14. Fourteenth week – the initial formation of the four limbs from the shoulders and hips.
15. Fifteenth week – initial appearance of the forearms and lower legs.
16. Sixteenth week – initial appearance of fingers and toes.
17. Seventeenth week – formation of the channels which connects the outer and inner parts of the body. This period from 10^{th} to 17^{th} week is called the period of turtle (because the foetus has limb and head development).
18. Eighteenth week - formation of muscular and adipose tissue.
19. Nineteenth week – formation of tendons and ligaments
20. Twentieth week – formation of bone tissue and marrow.
21. Twenty first week – the covering (of the body) with external skin.
22. Twenty second week – the opening of the nine orifices of the sense organs and so forth.

23. Twenty third week – growing of hair, body-hairs and nails.
24. Twenty forth week – clear maturation of the solid and hallow viscera.
25. Twenty fifth week – origination of the flow of wind.
26. Twenty sixth week – clarity of mental recollection.
27. From twenty seventh to the thirtieth week – manifest completion of the foetal development.
28. From the thirty first to thirty fifth week – enlargement of the entire (foetus). This period is called the period of the pig (because the foetus consumes unclear residues).
29. Thirty sixth week – origination of a sense of manifest discontent (in the foetus owing to the unpleasant environment).
30. Thirty seventh week – growth of an urge to turn upside down.
31. Thirty eighth week – turning upside down.
32. A male (foetus) adopts a curled up posture at the right side (of the womb).
33. A female (foetus) adopts (this) posture at the left side.
34. If (these indications) are mixed, a hermaphrodite will emerge.
35. If both sides protrude, twins will be born.
36. Occupation of right side and the prior appearance of milk in the right breast (along with dreams of a male figure) are signs that the foetus is a boy.
37. The opposite, occupation of left side (along with dreams of a female figure) is a sign that a girl will be born.

C. Parturition and correct provisions:

1. Parturition
2. Cutting of the umbilical cord.
3. Sustenance of the child by means of correct provisions.
4. Sustenance of the mother by means of correct provisions.

Unit II: Basic Anatomy in Similes (10hrs.)

A. Lineage of the innermost spirituality of yuthokpa:

B. Metaphors for the body structure:

1. Hipbones – like the foundations of a wall.
2. Vertebrae – like a stack of gold coins.
3. Channel of life – like an agate pillar.
4. Breast–bone – like a crossbeam.
5. Twenty four ribs – like rafters
6. Costal cartilages – like brackets supporting (the ribs)
7. Channels, tendons and ligaments, arrayed like ceiling planks.
8. Muscle and skin, like the colored plaster which covers a house.
9. Two shoulder-blades, like lateral buttresses.
10. Two collar-bones, like the cornice fixed on a house.
11. Head, like the turret or uppermost shrine.
12. Five sense organs, like the windows of a house.
13. Right an left ears, Garuda gargoyles.
14. Skull, like a Chinese roof.
15. Posterior fontanelle, like a chimney.
16. Nostrils, like the spire.
17. Hair tufts, like roof tiles.
18. Two arms, like silk hangings.
19. Upper and lower trunk, like upper and lower courtyards.
20. Diaphragm, like a silk curtain.
21. Heart, like an enthroned king.
22. Kidneys, like foreign ministers or beam-lifting athletes.
23. Reservoir for reproductive fluid, like a treasure-store of gems.

24. Stomach, like a cooking pot.
25. Small and large intestines, like the retainers of the two queens.
26. Gall bladder, like a sack full of spices.
27. Urinary bladder, like a filled water jar.
28. Two lower pass ways, like drainage gutters.
29. Two legs, like arched pediments.
30. Vulnerable (body) points, like the king's representatives.

Unit III: Quantitive Anatomy (37hrs.)

Sub unit I: The natural physical condition of the body concerning the measurement (of bodily constituents in a healthy organism).

1. The measurement of wind (equals) the volume of the urinary bladder.
2. The measurement of bile (equals) the volume of the scrotum.
3. The measurement of phlegm (equals) three cupped handfuls.
4. The measurement of blood (equals) seven cupped handfuls.
5. The measurement of faces (equals) seven cupped handfuls.
6. The measurement of urine (equals) four cupped handfuls.
7. The measurement of serum (equals) four cupped handfuls.
8. The measurement of grease (equals) two cupped handfuls.
9. The measurement of adipose tissue (equals) two cupped handfuls.
10. The measurement of vital fluid is one single handful.
11. The measurement of semen is one single handful.
12. The measurement of brain is one cupped handful.
13. The measurement of muscle tissue/flesh is five hundred closed handfuls.
14. In females, the breast comprises ten additional closed handfuls.
15. In females, the thighs comprise ten additional closed handfuls.
16. The measurement of breast milk (equals) two cupped handfuls.
17. The measurement of menstrual blood (equals) four cupped handfuls.

Sub unit II: Anterior view of the body:

A. Pores:

1. Pores above the collar-bone level – seven million.
2. Pores of the right arm – three and half million as indicated here.
3. Pores of the left arm – three and half million, as indicated here.
4. Pores of trunk – fifteen million, as indicated here
5. Pores of the right leg – seven and half million, as indicated here.
6. Pores of the left leg – seven and half million, as indicated here.

B. Bones:

1. The series of 28 vertebrae, among the two hundred and ten minor joints.
2. The thirty two roots of the teeth and the joints which connect the twenty bones between the ears and the bones (above) the oesophagus, among the two hundred and ten minor joints, as indicated here.

C. Solid viscera:

1. The first solid viscera, the heart.
2. The second solid viscera, the lungs.
3. The third solid viscera, the liver.
4. The fourth solid viscera, the spleen.

D. Hollow viscera:

1. The first hollow viscera, the stomach.
2. The second hollow viscera, the small intestine.
3. The third hollow viscera, the large intestine.
4. The fourth hollow viscera, the gall bladder.
5. The fifth hollow viscera, the urinary bladder.

Sub unit III: Posterior view of the body:

A. Head:

1. A side drawing of (the bone structure of) the mouth, among the three hundred and sixty bones, as indicated.
2. A mouth with thirty two teeth.
3. Ten molars (left)
4. Front teeth which are essential for speech (upper).
5. Ten molars (right)
6. Front teeth which are essential for speech (lower)
7. Twenty one hundred individual hairs of the head, as indicated.

B. Ligaments:

1. Three hundred ligaments above the collar bone.
2. Seventy five ligaments of the left arm.
3. Seventy five ligaments of the right arm.
4. Three hundred ligaments of the trunk.
5. Seventy five ligaments of the left leg.
6. Seventy five ligaments of the right leg.

C. Viscera:

1. The fifth solid viscera, the kidneys.
2. The seventh hollow viscera, the reservoir for reproductive fluid.

D. Counting the vertebrae:

1. Among the three hundred and sixty bones, each of the vertebrae is counted as a combination of four bones which have channel like markings.

E. Female body:

1. Female body has twelve orifices including the entrance to the womb and the breasts, as indicated.

Sub unit IV: Topographical lines of the channels:

A. Anterior view of the topographical lines of channels:

Lines of channels of:-

1. embryonic formation
2. existence and
3. connection according to the proper (medical) tradition.

B. Posterior view of the topographical lines of channels:

Lines of channels of:-

1. embryonic formation
2. existence and
3. connection according to the proper (medical) tradition.

Sub unit V: Diffusion of the channels:

A. Diffusion of minor channels:

1. Diffusion of the three hundred and sixty minor channels.
2. Diffusion of the seven hundred minor channels.

B. Diffusion of the most minute channels as a net throughout the body:

Sub unit VI: Life span principle:

1. The course of life-span principle.
2. Pervasion (of the life-span principle).
3. The fluctuation of the course of the life-span principle.
4. Movement of the course of life-span principle.

Sub unit VII: Blood-letting vessels:

1. Seventy-seven channels used for blood-letting.
2. Blood-letting vessels of different pars of the body.

Sub unit VIII: Connections of the channels:

Connections of the (inner) water channels and the (six) outer channels from the white channel (of life) which descends from brain.

Sub unit IX: Views of the bodies vulnerable points:

1. Anterior view of the body's vulnerable points, starting with vulnerable muscles and concluding with vulnerable orifices.
2. Posterior view of the body's vulnerable points including muscles and adipose glands.

Unit IV: Basic physiology of mind/body: (5 hrs.)

A. Introduction:

B. Wondrous synopsis concerning the humours:

1. the food which contents the five elements: date-palm fruit and a concentrated medicinal paste derived from the (Indian) mulaseta flower.
2. Physical location of the three humours.

Unit V: Classification of human body:(5hrs.)

1. Physical distinction of sex
   - Male
   - Female
   - Hermaphrodite: with signs of both sexes, sexless, changeable, impotent or frigid, eunuch or castrated.
2. Distinction of age: child, adult, aged.
3. Natural constitution: characteristics brought about by humoural combinations.

Unit VI: Indications/signs of decay/death: (10hrs.)

1. The indications which cross the physician's path and their supplements which derives from the text entitled "Rays of moon".
2. The indications starting from the omens encountered on the path (of physician) and (continuing down to) the origin of dreams of different types through the penetration of the mind and its movement in association with wind.
3. The indicators starting form the auspicious dreams of longevity free from diseases (such as that) of the deva Brahma, and continuing down to the aversion of the omens of impending death.

Unit VII: Primordial causes of disorders: (5hrs.)

1. Inseparability of ignorance – which is the general primary cause of disease.
2. Desire, among the three poisons which are the particular primary causes.
3. Hatred among the three poisons which are the particular primary causes.
4. Delusion among the three poisons which are the particular primary causes.
5. The blazing of the bile upwards from the lower part of the body
6. The downward descent of the Phlegm from the upper part of the body.
7. The pervasion of the both heat and cold by wind.

Unit VIII: Secondary causes of disorders: (10hrs.)

A. Seasonal accumulation of humours:

1. Accumulation of wind in hot season.
2. Accumulation of bile in (rainy) summer season.
3. Accumulation of phlegm at the end of winter.

B. Secondary causes of contributing to the diseases of wind.

1. Reliance on a bitter, light and rough diet.
2. Sexual exhaustion.
3. Fasting
4. Insufficient sleep.
5. Vigorous work on an empty stomach.

6. Excessive loss of blood.
7. Diarrhea
8. Vomiting
9. Exposure to cold winds.
10. Crying to the point of exhaustion.
11. General sorrow and mental anguish.
12. Unrestrained chatter.
13. Consumption of a prolonged non-nutritious diet.
14. Vigorous retention and straining.

C. Secondary causes contributing to the diseases of bile:

1. Reliance on a diet of hot tasting food.
2. Reliance on a sharp, hot and oily diet.
3. Surging of strong hatred or anger in the mind.
4. Sleeping exposed to the mid summer heat.
5. Vigorous work immediately after a period of rest.
6. Carrying on an unbearable load.
7. Digging solid earth.
8. Drawing a tight bow.
9. Wrestling
10. Racing
11. Walking and working in the mid day and so forth.
12. Being thrown by a horse
13. Being buried by an avalanche etc.
14. Being struck by a stone.
15. Being struck by a cudgel.
16. Excessive consumption of meat, butter and molasses.
17. Overeating and drinking, including the (excessive) drinking of wine.

D. Secondary causes contributing to the diseases of Phlegm:

1. Drinking (a decoction of) cooked dendelion and dendelion herbs.
2. Drinking milk
3. Resting after a heavy meal
4. Lying in damp ground and sleeping in day time.
5. Emersion in water (specially at the end of winter)
6. Being chilled due to tight clothing in the cold season.
7. Consumption of newly harvested, yellow unripe (cereals and fruits) including wheat and pulses.
8. Consumption of rotten food.
9. Consumption of goat meat and the flesh of hybrid cattle.
10. Excessive consumption of fat and bone marrow.
11. (Consumption of stale) grain seed oil.
12. Consumption of (stale) butter derived form herbivores and other rancid (substances)
13. Consumption of stale greens.
14. Consumption of sour radishes
15. Consumption of (raw) uncooked (root plants) including wild garlic.
16. Drinking warm (unboiled) goat's milk and uncultured yoghurt.
17. Drinking spoiled butter milk.
18. Drinking cold water.
19. Drinking lukewarm tea.

Unit IX: Manners of how diseases enter human body: (10hrs.)

Locations associated with diseases of three humours:

1. Those of wind have their (incipient) location in the bones.
2. Those of bile have their (incipient) location in the blood (and perspiration).
3. Those of phlegm have their (incipient) location in other (physical constituents eg. Chyle, muscle, adipose tissue, bone marrow, semen, faeces and urine).
4. (The intestines, hip-sockets, bones, joints, skin and ears) are known (as the incipient locations) for wind dysfunctions.
5. (The blood, perspiration, chyle, serum, eyes, skin and the area between the stomach and the navel) are known (as the incipient locations) for bile dysfunctions.
6. (The stomach, chest, throat, lungs, head, chyle, muscle and adipose tissue, bone marrow, semen, faeces, urine, nose, and tongue) are known (as the incipient locations) for phlegm dysfunctions.

Unit X: The symptoms of diseases: (11hrs.)

Characteristics of disorders:

1. Symptoms of an excess of wind.
2. Symptoms of an excess of bile.
3. Symptoms of an excess of phlegm.
4. (Symptoms of) an excess of chyle.
5. (Symptoms of) an excess of blood.
6. (Symptoms of) an excess of muscle tissue.
7. (Symptoms of) an excess of adipose tissue.
8. (Symptoms of) an excess of bone tissue.
9. (Symptoms of) an excess of bone marrow.
10. (Symptoms of) an excess of semen.
11. (Symptoms of) an excess of faeces.
12. (Symptoms of) an excess of urine.
13. (Symptoms of) an excess of perspiration.
14. (Symptoms of) an excess of minor (Excretions: tears, ear wax, nasal mucus and saliva).
15. (Symptoms of) deficiency of wind.
16. (Symptoms of) deficiency of bile.
17. (Symptoms of) deficiency of phlegm.
18. (Symptoms of) deficiency of chyle.
19. (Symptoms of) deficiency of blood.
20. (Symptoms of) deficiency of muscle tissue.
21. (Symptoms of) deficiency of adipose tissue.
22. (Symptoms of) deficiency of bone tissue.
23. (Symptoms of) deficiency of bone marrow.
24. (Symptoms of) deficiency of semen.
25. (Symptoms of) deficiency of faeces.
26. (Symptoms of) deficiency of urine.
27. (Symptoms of) deficiency of perspiration.
28. (Symptoms of) deficiency of color-transforming (pigmentation).
29. Life sustaining food and drink.
30. (Fresh) milk.
31. (Fresh) meat broth.

Practical skills: (160 hrs)

Unit I: Develop Embryological skills:

1. Illustrate conception
2. Enlist defective and non-defective semen/uterine blood.
3. Draw/illustrate various stages of foetus development – conception to 38th week including
   a) Fish stage
   b) Turtle stage
   c) Pig stage
4. Assist in delivery
5. Assist in cutting umbilical cord
6. Manage correct provisions for the sustenance of the child and mother.

Unit II: Develop skills on basic anatomy in similes:

1. Enlist metaphors/similes for body structure.
2. Draw/illustrate six hollow organs.
3. Draw/illustrate five solid organs.
4. Draw/illustrate skeletons.

Unit III: Develop skills on quantitive anatomy:

1. Perform measurements of bodily constituents in a healthy organism.
2. Draw/illustrate anterior view of the body including:
   a) Various pores
   b) Various bones
   c) Various solid viscera
   d) Various hollow viscera
3. Draw/illustrate posterior view of the body including:
   a) Head
   b) Ligaments
   c) Viscera
   d) Count of Vertebrae
   e) Female body
4. Draw/illustrate whole systems of the body.
5. Draw whole of nervous system.
6. Point the essential nerves of the various parts of the body.
7. Identify essential bones.
8. Show connections between nerves and body organs.
9. Read life pulse.
10. Identify holes of human body.
11. Draw/illustrate anterior view of the topographical lines of channels.
12. Draw/illustrate posterior view of the topographical lines of channels.
13. Illustrate diffusion of channels (major and most minute).
14. Illustrate blood letting vessels.
15. Illustrate connections of the channels.
16. Illustrate anterior and posterior views of body's vulnerable points.

Unit IV: Develop skill on basic physiology of mind/body:

1. Identify food which contains five elements.
2. Show physical location of the three humours.
3. Demonstrate/illustrate digestion/digestive system.
4. Perform drawings related to wind.
5. Perform drawings related to bile.
6. Perform drawings related to phlegm.
7. Show categories of sex through drawings.
8. Demonstrate/illustrate the relationship of five cosmo-physical elements with six tastes and three post digestive tastes.
9. Enlist the qualities of five cosmo-physical elements.
10. Demonstrate relationship between five cosmo-physical elements and internal body organs.

Unit V: Classify human body:

1. Classify human body on the basis of physical distinction of sex.
2. Classify human on the basis of distinction of age.
3. Classify human on the basis of natural constitution (the characteristics of people with a predominance of wind, bile, phlegm and their combinations).

Unit VI: Identify signs of death:

1. Demonstrate the signs of death through drama.
2. Demonstrate the signs of the last stage of the death.
3. Demonstrate the happenings/events encountered by the messenger(s) that indicates death of the patient (including dream and change of patient's behavior).
4. Demonstrate whole signs of death.
5. Demonstrate nearest signs of death.

Unit VII: Enlist primordial/primary causes of disorders:

1. Enlist primary causes of disorders.
   a) List general primary causes of disorders.
   b) List particular primary causes of disorders.
2. Identify/draw similes to the three poisons (Peacock, snake and pig).
3. Demonstrate/illustrate the followings:
   a) Upward blazing of bile (bile causes).
   b) Downward descent of phlegm (phlegm causes).
   c) Pervasion of heat and cold by wind (wind causes).
4. Specify/identify locations of the causes.

Unit VIII: Enlist immediate/secondary causes of disorders:

1. Demonstrate/show/illustrate four seasons.
2. List/illustrate diseases connected with each season.

3. List/illustrate seasons of accumulation/storage, raise and fall/relief of diseases.
4. List/illustrate secondary causes contributing to the diseases of wind, bile and phlegm.

Unit IX: Demonstrate the manner of how disease enter human body:

1. Draw/illustrate/show similes of diseases entering the human body.
2. Identify/illustrate/point incipient locations associated with diseases of three humours (wind, bile and phlegm).
3. Compare the causes of disease with cloud and rainfall.

Unit X: Identify symptoms of diseases:

1. Identify/memorize the symptoms/characteristics of disorders in case of:
   a) An excess of three humours.
   b) An excess of seven bodily constituents and
   c) Three excretions.
2. Identify/list/memorize the symptoms/characteristics of disorders in case of
   a) Deficiency of three humours.
   b) Deficiency of seven bodily constituents and
   c) Three excretions.
3. Identify/memories the characteristics of human body in the balanced state of
   a) Three humours.
   b) Seven bodily constituents.
   c) Three excretions.

3. Subject: Quintessential Tantra - I

Hours:	**Marks:**
Theory:120	**Theory: 100**
Practical:160	**Practical:50**
Total: 280	**Total:150**

Description:

This subject provides students the basic knowledge and skills on diagnosis and treatment of various human health disorders through the principles and practices of Amchi medicine.

Objectives:

1. To illustrate/explain points for moxibustion, minor surgery and blood letting.
2. To perform/explain concept, principle and practice of diagnosis and treatment of rlung disorders.
3. To perform/explain concept, principle and practice of diagnosis and treatment of Mkhris-Pa disorder.
4. To perform/explain concept, principle and practice of diagnosis and treatment of Bad-kan disorders.
5. To perform/explain concept, principle and practice of diagnosis and treatment of general fever.
6. To perform/explain concept, principles and practices of diagnosis and treatment of hot and cold diseases.
7. To perform/explain concept, principle and practice of diagnosis and treatment of Ri-Thang-Mtsams.
8. To perform diagnosis and treatment of immature fever.
9. To apply the skills and knowledge acquired through this subject towards the quality human health services.

Unit I: Introduction: (15hrs.)

1. Request to reveal the quintessential tantra.
2. Introduction to the points for moxibustion, minor surgery and blood letting.
   a) Anterior view of the points/loci for moxibustion, minor surgery and blood letting.
   b) Posterior view of the points for moxibustion, minor surgery and blood letting.

Unit II: Diagnosis and treatment of rlung disorder: (20hrs.)

1. Primary causes of rlung disorders.
2. Secondary causes of rlung disorders.
3. Symptoms of rlung disorders.
4. Diagnosis of rlung disorders.
5. Medicines and treatment of rlung disorders.
6. Synopsis of the principles and procedures for the diagnosis and treatment of rlung disorders.

Unit III: Diagnosis and treatment of Mkhris-Pa disorder: (20hrs.)

1. Primary causes of mkhris-pa disorder.
2. Secondary causes of mkhris-pa disorder.
3. Symptoms of mkhris-pa disorder.

4. Diagnosis of mkhris-pa disorder.
5. Preparation of medicine for mkhris-pa disorder.
6. Treatment/management of specific mkhris-pa disorder.
7. Principles and procedures for the diagnosis and treatment of mkhris-pa disorders.

Unit IV: Diagnosis and treatment of Bad-kan disorder: (20 hrs.)

1. Primary causes of Bad-kan disorder.
2. Secondary causes of Bad-kan disorder.
3. Symptoms of Bad-kan disorder.
4. Preparation of medicine to treat Bad-kan disorder.
5. Treatment of Bad-kan disorder.
6. Principle and procedures for the diagnosis and treatment of Bad-kan disorder.

Unit V: General Fever: Treatment: (10hrs.)

1. Primary causes of fever in general.
2. Secondary causes of fever in general.
3. Symptoms of general fever.
4. Diagnosis of general fever.
5. Treatment/management of general fever.
6. Principles and procedures for the diagnosis and treatment of general fever.

Unit VI: Treatment of hot and cold diseases: (15hrs.)

1. An important approach in distinguishing a hot and cold disorder.
2. Causes of hot and cold disorders.
3. Symptoms of hot and cold disorders.
4. Diagnosis of hot and cold disorders.
5. Preparation of medicine for hot and cold disorders.
6. Treatment and management of hot and cold disorders.
7. Principles and procedures of the diagnosis and treatment of hot and cold disorders.

Unit VII: Management of ri-thang-mtsams: (10hrs.)

1. Primary causes of ri-thang-mtsams.
2. Secondary caused of ri-thang-mtsams.
3. Symptoms of ri-thang-mtsams.
4. Similes of ri-thang-mtsams.
5. Diagnosis of ri-thang-mtsams.
6. Preparation of medicine for ri-thang-mtsams.
7. Management/treatment of ri-thang-mtsams.
8. Principles and procedures for the diagnosis and treatment of ri-thang-mtsams.

Unit VIII: Treatment of immature fever: (10 hrs.)

1. Primary causes of immature/unripened fever.
2. Secondary causes of immature/unripened fever.
3. Symptoms of unripened fever.
4. Diagnosis of immature fever.
5. Treatment of immature fever.
6. Medicine for immature fever.
7. Principle and procedure for the diagnosis and treatment of immature fever.

Practical skills:(160 hrs.)

Unit I: Illustrate points for moxibustion, minor surgery and blood letting:

1. Show drama over requesting quintessential tantra.
2. Illustrate points for moxibustion, minor surgery and blood letting.
   a) Identify/memorize/draw an illustrated diagram of the anterior view of the following points/loci:
      - Moxibustion loci: various types including inner and outer loci.
      - Blood letting loci: various types
      - Surgical loci: various types including general and ophthalmic loci.
      - Moxibustion and blood letting loci.
      - Moxibustion and surgical loci.

   b) Identify/memorize/draw an illustrated diagram of the posterior view of the following points/loci:
      - Moxibustion loci: various types including exterior/outer, internal and lateral loci.
      - Moxibustion and surgical loci: various types.
      - Blood letting loci: various types.
      - Surgical loci: various types.
      - Moxibustion and blood letting loci.
   c) Draw well illustrated diagram of:
      - Human body and body parts showing anterior view of the points/loci.
      - Human body and body parts showing posterior view of the points/loci.

Unit II: Perform diagnosis and treatment of rlung disorder:

1. List/memorize primary and secondary causes of rlung disorder.
2. List/memorize the symptoms of rlung disorder.
3. Diagnose rlung disorders through,
   a) Pulse
   b) Urine
   c) Organ sense and
   d) Inquiry
4. Examine over-emotion.
5. Examine through natural behavior.
6. Identify specific rlung disorder.
7. Prepare medicines for the treatment of the rlung disorder.
8. Perform treatment of the rlung disorder.
9. Instruct patient regarding the treatment.
10. Carryout follow up of the patient/case.

Unit III: Perform diagnosis and treatment of mkhris-pa disorder:

1. List/memorize causes (primary and secondary) of mkhris-pa disorder.
2. List/memorize the symptoms of mkhris-pa disorder.

3. Examine patient through questions.
4. Examine color of the patient's body.
5. Examine patient's emotional behavior.
6. Examine pulse through characteristic feelings.
7. Examine patient's urine through its
    a) Color
    b) Vapour
    c) Bubble and
    d) Smell
8. Identify/diagnose the specific mkhris-pa disorder.
9. Write prescription.
10. Prepare medicines for the treatment of the mkhris-pa disorder.
11. Perform treatment of the mkhris-pa disorder.
12. Instruct/suggest the patient regarding the treatment of the disorder.
13. Carryout the follow up of the patient/case.

Unit IV: Diagnose and treat Bad-kan disorder:

1. Enlist/memorize causes (primary and secondary) of Bad-kan disorder.
2. List/memorize symptoms of Bad-kan disorder.
3. Examine patient through,
    a) Question
    b) Color and shape of the body
    c) Emotions
    d) Pulse
    e) Urine
4. Diagnose the specific Bad-kan disorder.
5. Write prescription.
6. Prepare medicine to treat the Bad-kan disorder.
7. Carryout treatment of the Bad-kan disorder.
8. Suggest/instruct the patient regarding the treatment.
9. Perform follow up services of the case handled.

Unit V: Diagnose and treat general fever:

1. Enlist/memorize primary causes of general fever.
2. Enlist/memorize secondary causes of general fever.
3. Enlist/memorize symptoms of general fever.
4. Diagnose general fever
5. Treat general fever.

Unit VI: Perform treatment of hot and cold diseases:

1. Enlist/memorize causes of hot and cold diseases.
2. Enlist/memorize symptoms of hot and cold diseases.
3. Distinguish between hot and cold diseases.
4. Diagnose hot diseases through questions, urine examination and pulse feeling.
5. Diagnose cold diseases through questions, urine examination and pulse feeling.
6. Prepare medicine for hot disease

7. Prepare medicine for cold disease.
8. Perform treatment for hot and cold disorders/diseases.
9. Perform instruction to the patient regarding diet, medication and conduct for the management of hot and cold disorders.
10. Perform follow up of the cases.

Unit VII: Treat ri-thang-mtsams:

1. Enlist/memorize the causes (primary and secondary) of ri-thang-mtsams.
2. Enlist/memorize the symptoms of ri-thang-mtsams.
3. Draw similes of ri-thang-mtsams.
4. Diagnose ri-thang-mtsams through urinalysis, palpation and questioning.
5. Examine emotional behavior of the patient.
6. Prepare medicine for ri-thang-mtsams.
7. Perform treatment for ri-thang-mtsams.
8. Instruct patient about the treatment of ri-thang-mtsams.
9. Carryout follow up of the case(s).

Unit VIII: Perform treatment of immature fever:

1. Enlist/memorize primary causes of immature (unripened) fever.
2. Enlist/memorize secondary causes of immature fever.
3. Enlist/memorize symptoms of immature fever.
4. Diagnose immature fever.
5. Perform treatment for immature fever.
6. Instruct patient about the treatment.
7. Carryout follow up of the patient/case.

4. Subject: Last Tantra - I

Hours:	**Marks:**
Theory:120	**Theory:100**
Practical:160	**Practical: 50**
Total: 280	**Total: 150**

Description:

This subject provides students the basic knowledge and skills regarding sphygmology, urinalysis, decoction, powdered medicine and pills.

Objectives:

1. To perform/explain principle/procedures/concepts of pulse taking of a patient.
2. To perform/explain urinalysis.
3. To perform/explain tongue examination.
4. To identify/explain the application of nine particular therapeutic principles.
5. To perform/explain the preparations of decoctions, powdered medicine and pills.
6. To perform/explain compounding of medicinal paste, butter, concentrates ash, wine (chang) and gemstone medications.
7. To apply the skills and knowledge acquired through this subject towards the quality human health services.

Unit I: Sphigmology: (20 hrs.)

A. The exposition of subsequent/last tantra:

1. Vidyajnana, the emanation of Buddha activities, expositor of the subsequent tantra.
2. Manasija – making obeisance.
3. Manasija – performing circumambulations
4. Manasija – requesting teaching.

B. General topics of sphigmology: concept, introduction and applications:

1. Recommended abstinences with respect to diet and conduct prior to the pulse examination.
2. Explanation concerning the right time for pulse examination.
3. Revealing the right place for pulse examination.
4. The extent of pressure applied by the physician's finger.
5. Manner of examination.
6. Examination of the three constitutional pulses.
7. Examination of pulse in accordance with the four seasons and five elements: constellation chart of the four seasons.
8. The seven astonishing pulses,
    a) Astonishing pulse prognostication concerning the household.
    b) Astonishing pulse prognostication concerning the examination of the movement of a traveler or guest.
    c) Astonishing pulse prognostication concerning the enemy.
    d) Astonishing pulse concerning prognostication through the pulse of friendship.
    e) Astonishing pulse concerning the examination of the prognostication of demons,
        - The retroactive causes from which demons emerge which are detected at the liver pulse.
        - The retroactive causes for the demons entering the heart pulse in spring.

- The retroactive causes (i. e. terrain and so forth) from which these demons emerge which are detected at the heart pulse.
- The retroactive causes for demons entering the spleen pulse in spring.
- The retroactive causes which are detected at the spleen pulse.
- The retroactive causes for demons entering the lung pulse of the iron element in spring.
- The retroactive causes for demons entering the kidney pulses in spring.

f) Extraordinary pulse prognostication according to the method called the "fire-water reversion": a son may be examined when his father is sick etc.
g) Astonishing pulse prognostication concerning the examination of pregnancy pulse.

9. Examination of the number of pulsations in relation to disease and health.
10. General and specific pulses which are observed during diagnosis.
    a) Six general pulse signs pertaining to fever.
    b) Six general pulse signs pertaining to cold diseases.
    c) The diagnosis of disease through their specific pulse: wind dysfunction, bile dysfunction, phlegm dysfunction etc.
11. The death pulse
12. The pulse indicative of demon possession, the sudden bewitching by demons and the bestowal of ritual offerings.
13. The lifespan principle
    a) Concept of lifespan and life essence.
    b) Examination of the signs of the life span principle at the pulse of the life essence (i e. the ulnar artery).

Unit II: Urinalysis: (20 hrs.)

1. Preliminary abstentions: concept and introduction
2. The urine of healthy person: characteristics.
3. Examination of the color of urine of patient, principle and procedure.
4. Examination of urine vapour.
5. Examination of urine bubbles/flowers.
6. Examination of urine odour.
7. Examination of urinary suspension.
8. Examination of urine color and so forth based on "The king of moon" treatise.
9. Examination of urine scum.
10. Particular signs of urine indicative of heat disorders.
11. Particular signs of urine indicative of cold disorders.
12. Non-digestion, according to the king of moon.
13. Clarification of misleading types.
14. Urine indicative of impending death: through heat, cold, wind, bile, phlegm and kidney disorders as well as through poisoning.
15. Types of urine indicative of impending death (according to the king of moon).
16. Examination of urine (transported) from after.
17. The layout of the supine tortoise divination shell through which male subjects are examined for urine indicating demonic possession.
18. The layout of the upright tortoise divination shell of existence, through which the female subject is examined for urine indicating demonic possession.
19. Identification of the demons occupying the eight outer sectors, applicable to the examination of male and female urine alike.
20. Indication of the changing of urine specimen.
21. Recognition of the demons indicated by diverse impressions in the urine scum.

22. Sectors in which the classes of demons are recognized; the locality of the Gods, according to the divination technique for male urine.
23. Sectors in which the classes of demons are recognized; the locality of the Gods, according to the divination technique for female urine.
24. Urine divination system: according to the "king of moon" which is known as he "four standards of yak hair" and so forth (as for the three eastern sectors which together represent spring.
25. Three southern sectors which together represent summer.
26. Three western sectors which together represent autumn.
27. Three northern sectors which together represent winter.
28. Divination system concerning the top of the wish fulfilling tree and so forth, according to the king of moon treatise.
29. Examination of urine vapour according to the divination sectors.
30. Urinalysis according to the master Jinamitra (taking as an example the divination chart for those born in the tiger or hare year).
31. Urinalysis disclosed to yuthok yonten gonpo by the Dakini Karmamahendrani.
32. The method of generating change in an unchanging cold urine specimen.

Unit III: Examination of tongue: (15 hrs.)

A. Introduction:

1. General principles and procedures of tongue examination.
2. Tongue examination as the second technique of visual observation.
3. Application/uses of tongue examination.

B. Examination of tongue:

1. Tongue indicative of wind disorders: red, parched and rough.
2. Tongue indicative of bile disorders: coated with thick yellow phlegm.
3. Tongue indicative of phlegm disorders: a soft, moist and thick tongue.
4. Tongue indicative of severe wind disorders: parched at its innermost part.
5. Tongue indicative of fever that exceeds wind disorder in intensity: parched and shriveled.
6. Tongue indicative of that the wind and fever are of equal intensity: parched and black.
7. Tongue indicative of a simple manifest wind disorder: red, parched and rough.
8. Tongue indicating a complex disorder of wind and bile: yellow and parched inside.
9. Tongue indicating a complex disorder of phlegm and wind: pale and parched inside.
10. Tongue indicative of fever, diffused and turbid: thick and pale.
11. Tongue indicative of freedom form disease: red, soft, moist and supple.
12. Tongue indicative of impending death: black, parched, cracked and incapable of speech.

C. The nine particular therapeutic principles:

1. List of the nine particular therapeutic principles.
2. Concept, description and application of the nine principles each.

Unit IV: Compounding of decoctions: (15hrs.)

1. Concept, principles and procedures for compounding of decoctions.
2. Raw materials for the preparation of decoctions.
3. Preparation of decoctions for:
   a) Cold diseases
   b) Hot diseases
4. Method of checking potency.
5. Introduction to the research on decoctions.

Unit V: Powdered medicine: (15 hrs.)

1. Concept, principles, procedures and formulae for compounding of powders.
2. Raw materials for compounding of powders.
3. Making powders.
4. Compounding of powders.
5. Method of checking potency.
6. Research on compounding of powders.

Unit VI: Pills: (15 hrs.)

1. Concept, principle, procedure and formula for compounding of pills.
2. Raw materials for compounding of pills.

Unit VII: Compounding: (20 hrs.)

1. Principle and procedures for compounding of medicinal paste.
2. Principle and procedures for compounding of medicinal butter.
3. Principle and procedures for compounding of medicinal concentrates.
4. Principle and procedures for compounding of medicinal ash.
5. Principle and procedures for compounding of medicinal wine (chang).
6. Principle and procedures for compounding of medicinal gemstone medications.
7. Application/use of the compounded products.

Practical skills: (160 hrs.)

Unit I: Develop skills on sphygmology:

1. Enlist/memorize/practise the procedures on general topics of sphygmology.
2. Enlist/memorize various types of pulse with their characteristic features.
3. Identify/draw characteristics of yin and yang (cold and hot) pulse.
4. Identify/draw the three humour pulses and spirit pulses.
5. Read/take pulse of patients.
6. Diagnose the type of (pulse indicative of) disorder.
7. Suggest the patient about health management.

Unit II: Develop skills on Urinalysis:

1. Identify healthy/unhealthy urine.
2. Practise general procedures for urinalysis.
3. Perform urinalysis:
    a) Obtain urine
    b) Examine urine color/color change.
    c) Examine urine vapour.
    d) Examine urine odour/smell.
    e) Examine urine bubbles/flowers.
    f) Examine urinary suspension.
    g) Examine urine scum.
    h) Examine urine Tima (stickyness).
    i) Examine fresh/hot urine.
    j) Examine medium urine.

k) Examine cold urine.
l) Examine urine (transported) afar.

4. Diagnose disorder(s) based on urinalysis.
5. Provide treatment services.

Unit III: Perform tongue examination:

1. Identify healthy and unhealthy tongue.
2. Practise general procedures for tongue examination.
3. Perform specific tongue examination.
   a) Examine the tongue indicative of wind disorders.
   b) Examine the tongue indicative of bile disorders.
   c) Examine the tongue indicative of phlegm disorders.
   d) Examine the tongue indicative of severe wind disorders.
   e) Examine the tongue indicative of fever that exceeds wind disorder in intensity.
   f) Examine the tongue indicative of that the wind and fever are of equal intensity.
   g) Examine the tongue indicative of a simple manifest wind disorder.
   h) Examine the tongue indicative of a complex disorder of wind and bile.
   i) Examine the tongue indicative of a complex disorder of phlegm and wind.
   j) Examine the tongue indicative of diffused and turbid fever
   k) Examine the tongue indicative of freedom from diseases.
   l) Examine the tongue indicative of impending death.
4. Diagnose disorders based on tongue examination.
5. Provide treatment services.

Unit IV: Apply nine particular therapeutic principles:

1. Identify/enlist/memorize the nine particular therapeutic principles/procedures.
2. Apply the nine particular therapeutic principles in practice.
3. Provide health services through the application of the nine particular therapeutic principles and practices.

Unit V: Prepare decoctions:

1. Identify/collect raw materials for “compounding of decoctions”.
2. Practise general procedures for “compounding of decoctions”.
3. Prepare decoctions for hot diseases.
4. Prepare decoctions for cold diseases.
5. Illustrate the compounding of decoctions.
6. Check the potency of decoctions.
7. Assist in research on decoctions.

Unit VI: Prepare powdered medicine:

1. Identify powdered medicine.
2. Collect raw materials.
3. Powder the raw materials.
4. Mix powdered raw materials as per the formula for “compounding the powders”.
5. Perform compounding of powders.
6. Check the potency.
7. Assist in research related to powdered medicine.
8. Illustrate the compounding of powders.

Unit VII: Prepare pills:

1. Identify/collect raw materials for compounding of pills.
2. Identify pills.
3. Perform compounding of pills.
4. Check potency of pills.
5. Illustrate “compounding of pills”.
6. Assist in research on pills.

Unit VIII: Perform compounding:

1. Perform compounding of medicinal paste.
2. Perform compounding of medicinal butter.
3. Perform compounding of medicinal concentrates.
4. Perform compounding of medicinal ash.
5. Perform compounding of medicinal wine (chang).
6. Perform compounding of gemstone medications.

5. Subject: Environmental Health

Hours Theory: **90**
Hours Practical: **30**
Assessment Marks: **100**

Course Description:

This course introduces the student to the specialized skill and knowledge needed to provide environmental health services. The content is taught using classroom instruction and practical experiences in community based programmes and primary health care services during field practice at the Health Post and home visits. This course includes information about the relationship between environment and health, water resource management and conservation, waste management, food hygiene, healthful and sanitary housing, air quality management, control of rodents, arthropods and insects, and occupational health.

Course Objectives:

At the end of the course, the learner will be able to:

1. Describe the relationship between the environment and health, and show the impact of environment on health.
2. Describe water resources conservation and water quality management.
3. Explain proper waste management in urban and in rural areas.
4. Describe how to maintain food hygiene.
5. Describe standards of safe housing and effects of poor housing.
6. Explain air pollution and its management.
7. Describe methods of controlling rodents, arthropods and insect.
8. Identify occupational diseases and strategies for their prevention.

Minimum Standards:

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended Text:

Reference Books:

Course: Environmental Health	Hrs. theory		Hrs. lab
Unit: 1. Environmental Health Concepts	Hrs. theory		Hrs. lab
Sub-unit: Definition Define Terminology	Hrs. theory	1	Hrs. lab
1. Define: Environment Environmental Health Environmental Sanitation Environmental Pollution 2. Evaluate and describe the environmental health of your home community. 3. Give examples of environmental sanitation efforts in Nepal. 4. Describe examples of local, national, and global pollution. 5. Tell one thing you do to improve the environmental health of your community.	1. Definition of: Environment, Environmental Health, Environmental Sanitation, Environmental Pollution. 2. Examples of environmental health, sanitation and pollution. 3. Individual and collective efforts to promote environmental health.		
Evaluation methods:	Teaching / Learning Activities:		
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs		
Course: Environmental Health	Hrs. theory		Hrs. lab
Unit: 1. Environmental Health Concepts	Hrs. theory		Hrs. lab
Sub-unit: Relation of Environmental Health	Hrs. theory	1	Hrs. lab
1. Describe the relationship between environment and health. 2. Define the terms: agent, host, environment. 3. Give examples of agent, host and environment. 4. Give examples of diseases which have become more common because of changes in the land use, population migration, or environment in Nepal.	1. Relationship of environment and health - Agent - Host - Environment		
Evaluation methods:	Teaching / Learning Activities:		
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs		
Course: Environmental Health	Hrs. theory		Hrs. lab
Unit: 1. Environmental Health Concepts	Hrs. theory		Hrs. lab
Sub-unit: Environmental hazards and effects	Hrs. theory	1	Hrs. lab 2
1. Define environmental hazards and give examples. 2. Differentiate between biological and chemical hazards. 3. Describe the long term and short term effects of selected biological and chemical hazards. 4. Analyze different types of environmental hazards and suggest ways to reduce the harmful effects of environmental hazards.	1. Definition of environmental hazards 2. Types of effects of environmental hazards (Biological & Chemical)		
Evaluation methods:	Teaching / Learning Activities:		
Written examination, viva, practical	Classroom instruction, teacher led discussion, textbook, hand-outs, Case Study		
Course: Environmental Health	Hrs. theory		Hrs. lab
Unit: 1. Environmental Health Concepts	Hrs. theory		Hrs. lab

Sub-unit: Basic environmental threats	Hrs. theory 2 Hrs. lab
1. discuss basic environmental threats in Nepal 2. Identify different types of environmental threats. 3. Give examples of the three types of environmental threat. 4. Describe how you would implement measures to reduce one of these threats, as a health post manager.	1. Concept of environmental threats 2. Different types of environmental health threats - Intensification of Agriculture - Industrialization & health - Energy crisis & health
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs, Case Study
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 1. Environmental Health Concept	Hrs. theory Hrs. lab
Sub-unit: Environmental health issues in global and national context	Hrs. theory 2 Hrs. lab 2
1. Discuss the extent of environmental pollution as a health issue globally. 2. Identify three important environmental health issues in the world today. 3. Give examples of each of these issues in Nepal. 4. Analyze different types of health problems related to each form of pollution.	1. Concept of environmental pollution health issues 2. environmental pollution issues of global & national importance: - Water pollution - Air pollution - Noise pollution
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs, Case Study
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 2. Water	Hrs. theory Hrs. lab
Sub-unit: Introduction of Water	Hrs. theory 2 Hrs. lab 2
1. State the value requirement, nature and cycle of water 2. Define safe and wholesome water 3. Identify the uses of water	1. Value requirement, nature and water cycle. 2. Safe and wholesome water. 3. Uses of water - Domestic use - Public purpose - Industrial purpose - Agriculture purpose - Power production - Tourism
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 2. Water	Hrs. theory Hrs. lab
Sub-unit: Source of water	Hrs. theory 1 Hrs. lab
1. Identify various sources of water 2. Identify merits & demerits of different sources. 3. Discuss the reasons why some areas of Nepal experience water shortages more often now, than 40 years ago.	1. Sources of water - Rain - Surface water - Ground water - Shallow wells

4. Explain the relationship between deforestation and water shortages in Nepal. 5. Relate water shortages with quality of life and health. 6. Discuss ways to prevent water shortages.	- Deep wells - Springs
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 2. Water	Hrs. theory Hrs. lab
Sub-unit: Water pollution	Hrs. theory 3 Hrs lab 6
1. Define water pollution 2. Describe causes of water pollution 3. Explain the prevention of water pollution 4. Identify important water borne diseases.	1. Definition of water pollution 2. Cases of water pollution - Organic cause - Inorganic cause 3. Prevention of water pollution - Safe water supply - Sanitary well - Proper drainage system - Proper management of sewage and waste - Change in health habits of people - Health education. 4. Different types of diseases - Water borne - Water based - Water related - Water washed - Diseases due to chemicals
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 2. Water	Hrs. theory Hrs. lab
Sub-unit: Purification of water	Hrs. theory 5 Hrs. lab 6
1. Describe different ways to achieve water purification. 2. Describe different methods of water purification at the household level. 3. Describe how to disinfect well water. 4. Describe the methods of water purification on a large scale. 5. Describe the features of a sanitary well	1. Water purification in large scale & small scale 2. Household water purification Boiling Chemical Filtration 3. Disinfection of well 4. Large scale water purification Slow sand filtration Rapid sand filtration 5. Features of sanitary well
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 2. Water	Hrs. theory Hrs. lab

Sub-unit: Drinking water programs in Nepal	Hrs. theory 3 Hrs. lab 6
1. Describe the current drinking water systems in Nepal. 2. Identify various drinking water programmes of Nepal. 3. Analyze the drinking water situation of Nepal and give your idea on ways to improve this.	1. Drinking water system of both rural and urban area 2. Drinking water programming of Kathmandu Valley Melamchi water project 3. Drinking water situation of Nepal
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion
Course: Environmental Health	Hrs. theory Hrs. lab __
Unit: 2. Water	Hrs. theory Hrs. lab _
Sub-unit: Water quality	Hrs. theory 3 Hrs. lab 6
1. State the criteria and standards for water quality according to WHO and the Ministry of Health. - list the standards for good physical quality - list the standards for good chemical quality - list the standards for good biological quality 2. Give examples to illustrate low quality in each classification.	1. Criteria and standards of water quality 2. Water quality standards in regarding - Physical quality - Chemical quality - Biological quality
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Introduction of waste	Hrs. theory 1 Hrs. lab
1. define waste 2. give examples of solid waste and identify their sources. 3. give examples of liquid wastes and identify their sources. 4. give examples of hazardous wastes and identify their sources.	1. Types of waste -Solid waste -Liquid waste - Hazardous waste
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Solid waste	Hrs. theory 1 Hrs. lab
1. Identify examples of biodegradable and non-biodegradable solid wastes in Nepal. 2. Describe national efforts in Nepal and other countries to reduce the amount of non-biodegradable wastes. 3. Describe national and local efforts to introduce recycling of solid wastes. 4. Discuss ways the health post manager could educate the community and mobilize efforts to reduce solid waste problems.	1. Biodegradable and non-biodegradable solid wastes. 2. Strategies to reduce solid waste problems.

Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Solid waste Management	Hrs. theory 4 Hrs. lab 8
1. Explain the 3R concept of minimizing waste 2. Describe the disposal of waste in urban areas in Nepal and other countries. 3. Discuss the purposes and effectiveness of Nepal's anti-litter campaign. 4. Describe the disposal of waste in rural areas. 5. Analyze solid waste management in a typical urban household. 6. Describe the process of methane production from animal and human wastes. 7. Identify the advantages and disadvantages of each method of solid waste disposal. 8. Analyze solid waste management systems; under what situation is it best to use each method?	1. Minimizing waste 3R concept: - Reduce waste - Reuse waste - Recycle waste 2. Disposal of waste - Collection - Storage - Transportation - Ultimate disposal - Sanitary land filling - Dumping - Composting - Incineration 3. Disposal of waste in rural area - Burial - Manure pit
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Hazards of solid waste	Hrs. theory 1 Hrs. lab
1. Denitrify both health hazards and environmental hazards created by solid waste mismanagement. 2. Give examples when solid waste mismanagement resulted in health problems in other countries. 3. Identify an example of solid waste mismanagement in your own community.	1. Health hazards and environmental hazards from unhygienic or careless disposal of solid waste.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Hospital waste management	Hrs. theory 2 Hrs. lab 6
1. Identify different kinds of hospital waste. 2. Describe the communicable disease risks from improper disposal of excreta, vomit, urine, contaminated dressings, blood, used needles and other sharp instruments, broken glass. 3. Describe the correct management of hospital wastes. 4. Analyze the sanitation facilities at your clinical setting with regard to toilets and handwashing. 5. Describe the characteristics of a safe needle	1. Hospital waste 2. Hazards of hospital waste 3. Management of hospital waste -separation of waste -using incineration

disposal system. 6. Describe the management system of liquid and solid wastes at your clinical setting.	
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Excreta disposal in the community	Hrs. theory 8 Hrs. lab 6
1. Identify human waste 2. Describe health hazards due to improper excreta disposal 3. Describe methods of excreta disposal using a pit latrine. 4. describe the advantages and disadvantages of different types of pit latrines. 5. Describe the features of a water sealed latrine.	1. Human waste 2. Health hazards from improper excreta disposal 3. Methods of excreta disposal - unsewered areas - sewered areas 4. Types of latrine - pit latrine - ventilated improved pit latrine (VIP latrine) - aqua privy - chemical closet - deep trench and shallow trench latrine. 4. Features of water sealed latrine.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 3. Waste	Hrs. theory Hrs. lab
Sub-unit: Liquid waste management	Hrs. theory 6 Hrs. lab 8
1. Identify the components of liquid waste. 2. List sources of liquid waste. 3. Describe the management of liquid waste in household (small scale) & urban areas. 4. Describe the workings of each liquid waste disposal method. 5. Analyze the liquid waste management in household and urban areas of Nepal: - identify the advantages and disadvantages of different methods of waste management. - Tell the appropriate situation for using each waste management system.	1. Sources and components of liquid waste 2. Liquid waste management: at the household/institution level a. soakage pit b. soak well c. seepage pit d. cess pool e. dispersion trench f. septic tanks g. at the urban area h. waste water treatment plant reed bed
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 4. Food hygiene	Hrs. theory Hrs. lab

Sub-unit: Concept of food hygiene	Hrs. theory 2 Hrs. lab
1. Define food hygiene. 2. Explain importance of food hygiene. 3. Identity different food hygiene methods. 4. Discuss rules for food handling which ensure sanitary, hygienic conditions of eating places. 5. Tell which branch of government has responsibility and authority for evaluating sanitation of public eating places and food preparation industries.	1. Definition of food hygiene 2. Importance of food hygiene 3. Types of food hygiene - general food hygiene - milk hygiene - meat hygiene 4. Sanitation of eating places.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab ___
Unit: 4. Food hygiene	Hrs. theory Hrs. lab __
Sub-unit: Food borne disease	Hrs. theory 2 Hrs. lab ___
1. Discuss the incidence of food poisoning. 2. Identify common food borne diseases. 3. Identify foods which carry a high risk of containing toxins. 4. Give examples of bacterial, plant, and chemical poisons, which are injested with food. 5. Differentiate between food borne infections and bacterial food poisoning.	1. Food borne disease: food intoxication and food infection. 2. Food intoxication (food poisoning) Bacterial food poisoning Plant poisoning Chemical poisoning 3. Food borne infection.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 4. Food hygiene	Hrs. theory Hrs. lab
Sub-unit: Sources of food contamination.	Hrs. theory 2 Hrs. lab
1. Define food contamination. 2. Identify and describe sources of food contamination. 3. Give an example showing how a cook in a restaurant who has enteric infection can spread the bacteria to the customers. 4. Describe how milk might become bad if not refrigerated properly.	1. Definition of food contamination 2. Sources of food contamination - Human factors - Environmental factors.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 4. Food hygiene	Hrs. theory Hrs. lab
Sub-unit: Food Preservation.	Hrs. theory 3 Hrs. lab 2

1. Define food preservation 2. Identify purpose of food preservation. 3. Describe different methods of food preservation. 4. Analyze the food preservation practiced in Nepal. 5. Discuss the role of the health post manager in community education about safe food preservation.	1. Definition of food preservation. 2. Importance of food preservation. 3. methods of food preservation - Drying - Smoking - Cooking - Pickling - Fermentation - Pasteurization - Parboiling - Refrigeration/freezing - Canning & bottling
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 4. Food hygiene	Hrs. theory Hrs. lab
Sub-unit: Food additives, food fortification and food adulteration.	Hrs. theory 2 Hrs. lab 1
1. Define food fortification. 2. Explain importance of food fortification. 3. Explain different food fortification practices in Nepal. 4. Define food additives and describe different types of food additives. 5. State the hazards of using food additives. 6. Define food adulteration and discuss its hazards. 7. Describe different food adulteration practices.	1. Definition of food fortification 2. Importance of food fortification 3. Food fortification practical 4. Definition of food additives 5. Types of food additives 6. Hazards due to food additives 7. Definition of food adulteration 8. Hazards due to food adulteration 9. Food adulteration practiced in Nepal.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 4. Food hygiene	Hrs. theory Hrs. lab
Sub-unit: Milk hygiene.	Hrs. theory 4 Hrs. lab 6
1. State what is meant by milk hygiene. 2. Identify milk borne diseases. 3. Describe the processes/components of milk hygiene.	1. Definition of milk hygiene 2. Milk borne diseases 3. Components of milk hygiene Health animal Hygienic milking Preliminary treatment Pasteurization 4. Methods of Pasteurization - Holder method - HTST method - UHT method 4. Handling before consumption.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 4. Food hygiene	Hrs. theory Hrs. lab

Sub-unit: Meat hygiene.	Hrs. theory 3 Hrs. lab 6
1. Explain why meat hygiene is necessary for public health. 2. Identify meat borne disease 3. Describe the process of meat inspection 4. State the characteristics of sound & unsound meat. 5. Identify the requirements for safe storage of meat. 6. Describe the minimum standards required of slaughterhouse businesses. 7. Discuss the enforcement of meat handling standards. 8. list the concepts to include in a health education program for community awareness of safe meat hygiene practices	1. Meat hygiene 2. Meat borne disease 3. Meat inspection 4. Ante mortem inspection 5. Post mortem inspection 6. Characteristics of sound and unsound meat. 7. Storage of meat. 8. Slaughter house and its minimum standards.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 5. Housing	Hrs. theory Hrs. lab
Sub-unit: Concepts of housing.	Hrs. theory 1 Hrs. lab
1. Define housing, human settlement, residential environment, slum. 2. Discuss how the three kinds of housing are alike and different. 3. Describe social goals of housing. 4. Describe how well the social goals of housing are met by each of the three kinds of housing.	1. Definition of housing, human settlement, residential environment and slum. 2. Social goals of housing.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 5. Housing	Hrs. theory Hrs. lab
Sub-unit: Principles of housing.	Hrs. theory 2 Hrs. lab
1. Discuss the basic principles of housing. 2. Describe criteria for healthful housing. 3. Analyze your present housing situation, using the criteria. 4. Discuss ways you could improve your current housing situation.	1. Principles of housing Physiological Psychological Healthful Free from accidents 2. Criteria for healthful housing
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 5. Housing	Hrs. theory Hrs. lab

Sub-unit: Housing standards	Hrs. theory 2 Hrs. lab
1. Define the term "standards." 2. Explain how housing standards can help improve living conditions. 3. Discuss the health hazards of housing which lacks good ventilation and lighting. 4. Describe important housing standards used in urban areas. 5. Describe the housing standards used in rural areas, and explain why these are different from urban housing standards. 6. Tell what construction requirement is required to protect from earthquake collapse.	1. Basic housing standards in terms of site, material, space, light, ventilation, waste disposal etc. 2. Types and ways to provide adequate ventilation. 3. Rural housing standards.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab _
Unit: 5. Housing	Hrs. theory Hrs. lab __
Sub-unit: Housing & health	Hrs. theory 1 Hrs. lab __
1. Discuss the increased health risks to people who live in sub-standard housing. 2. Describe the negative effects which poor housing has on a person's social and psychological health. 3. Discuss the environmental damage, which occurs when groups of people live in temporary, sub-standard housing. 4. Discuss community solutions to substandard housing problems in Nepal.	1. Effect of poor housing in terms of health & environment.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 5. Housing	Hrs. theory Hrs. lab
Sub-unit: Overcrowding	Hrs. theory 2 Hrs. lab
1. Define overcrowding 2. State accepted standards with respect to overcrowding. 3. Describe the social, psychological and behavioral effects of overcrowding. 4. Explain the reasons for providing separation of persons by gender.	1. Definition of overcrowding 2. Effects of overcrowding 3. Accepted standards with respect to overcrowding in terms of : - Persons per room - Floor space - Ventilation 4. Sex separation.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, teacher led discussion, textbook, hand-outs, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 5. Housing	Hrs. theory Hrs. lab
Sub-unit: Health issues in housing and their effects.	Hrs. theory 6 Hrs. lab 2
1. Discuss the causes, effects, and control of noise	1. Noise pollution :

pollution 2. Describe the types, sources and effects of radiation exposure. 3. Discuss ways to reduce exposure to natural radiation and harmful effects of the sun. 4. Describe ventilation standards and their purposes. 5. Describe different ways to ensure adequate ventilation. 6. Identify health risks related to poor ventilation.	- Definition - Effects of noise exposure - Acceptable noise levels - Control of noise. 2. Radiation - Sources of radiation exposure - Types of radiation - Effects of radiation - Radiation protection 3. Ventilation - Standards of ventilation - Types of ventilation.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 5. Housing	Hrs. theory Hrs. lab
Sub-unit: Housing Situation and National Policy.	Hrs. theory 2 Hrs. lab
1. Explain the housing situation of Nepal 2. Describe National Housing Policy 2053.	1. Housing situation of Nepal 2. National Housing Policy 2053.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	- Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 6. Air	Hrs. theory Hrs. lab
Sub-unit: Introduction of air pollution.	Hrs. theory 4 Hrs. lab 2
1. Describe air and its composition. 2. Define air pollution . 3. Describe effects of air pollution on health and society. 4. Describe sources air pollution. 5. Describe indicators of air pollution. 6. Identify persons who are at risk when air pollution is high. 7. Analyze the air pollution in your own community.	1. Air & its composition 2. Definition of air pollution 3. Effects of air pollution - Health aspect - Social and economic aspects 4. Sources of air pollution a) Automobiles b) Industries c) Domestic sources d) Tobacco smoking e) Other source 5. Air pollutants 6. Indicators of air pollution.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 6. Air	Hrs. theory Hrs. lab
Sub-unit: Prevention and control of pollution.	Hrs. theory 2 Hrs. lab 2
1. Describe measures for the prevention and control of air pollution. 2. Identify methods for disinfection of air. 3. Analyze air pollution prevention and control measures in your community and in Nepal.	1. Measures of air pollution control and prevention. 2. Disaffection of air - Mechanical ventilation - Ultraviolet radiation - Chemical mists - Dust control.

Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 6. Air	Hrs. theory Hrs. lab
Sub-unit: Major issue in air pollution.	Hrs. theory 2 Hrs. lab 3
1. Describe the theory of the green house effect, its causation and effects. 2. Describe the current situation of ozone depletion, its causation and effects (impacts). 3. Explain what is meant by "acid rain." 4. Describe the causes and impact of acid rain. 5. analyze the pros and cons of industrialization, which reduces poverty, and improves social conditions, but at a cost to our environment.	1. Definition of and causes and effects of - Green house effects - Ozone depletion - Acid rain.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 7. Rodentology	Hrs. theory Hrs. lab
Sub-unit: Rodents and their effects	Hrs. theory 3 Hrs. lab 1
1. Define rodentology. 2. Identify different types of rats, their characteristics, biotic, and habits. 3. Identify the disease potentials created by the presence of rat populations in a community. 4. Describe economic destruction by rodents.	1. Definition of rodentology 2. Different types of rats, their characteristics, biotic, and habits, and disease potential due to rats. # Domestic rodents. - Black rat (Ratters rattus) - Sewer rat (R. norvegicus) - Roof rat (R. alexandrinus) - House mouse # Wild rodents. Esp. Tarai India. 3. Rodent borne diseases: bacterial, viral, rickettsial, parasitic, others. 4. Economic destruction by rodents.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 1 Noise pollution	Hrs. theory Hrs. lab
Sub-unit: noise and radiation pollution	Hrs. theory 1 Hrs. lab
1. Discuss causes, effects, and control of noise pollution. 2. Describe the types, sources and effects of radiation exposure. 3. Discuss ways to reduce exposure to natural radiation and the harmful effects of the sun. 4. Relate exposure to harmful sunrays to cataracts and skin cancer.	1. Definition of noise pollution, effects of chronic exposure to noise, safe noise levels, control of noise. 2. Sources, types, effects, and protection from radiation exposure.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab

Unit: 7. Rodentology	Hrs. theory Hrs. lab
Sub-unit: Rodents Control Measures.	Hrs. theory 4 Hrs. lab
1. Describe rodents control measures. 2. Identify the advantages of each method. 3. Describe the role of the health post manager in community efforts to control of rodents.	1. Rodents control measures a) Rodents survey technique b) Environmental Sanitationary c) Trapping d) Rodenticides e) Furmigation f) Chemosterilants g) Biological Control
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 8. Entomology	Hrs. theory Hrs. lab
Sub-unit: Introduction of Entomology.	Hrs. theory 2 Hrs. lab 2
1. Define entomology and medical entomology 2. Identify medically important arthropods and insects. 3. Identify arthropod and insect borne diseases. 4. Describe the transmission of each of the common arthropod/insect borne diseases.	1. Definition of entomology and medical entomology. 2. Arthropod and insect borne diseases. 3. transmission modes: - direct contact - mechanical transmission - biological transmission - - propagative - - cyclo-propagative - - cyclo-developmental
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 8. Entomology	Hrs. theory Hrs. lab
Sub-unit: Arthropod borne diseases	Hrs. theory 2 Hrs. lab
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 8. Entomology	Hrs. theory Hrs. lab
Sub-unit: Arthropod Control.	Hrs. theory 10 Hrs. lab
1. Describe principles of arthropod control. 2. Describe the measures to control arthropod and insect diseases. 3. Identify diseases caused by: mosquito, housefly, bed bug; redevid bug, hard tics, soft ticks, trombiculid mites, itch, mites, cycleps, cockroaches, louse, fleas. 4. Identify the actions of different types of insecticides and repellents.	1. Principles of arthropod control. - Environmental control - Chemical control - Biological control . - Genetic control 2. Medically important arthropods and insects and measures to control each of these. 3. Diseases transmitted by: mosquito, house fly, bed bug, reduvid bug, hard, ticks, soft ticks, trombiculid mites, itch mites, cyclops, cockroaches, louse, fleas. 4. Actions of different types of insecticides and repellents. 5. Insecticide resistance.

Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical
Course: Environmental Health	Hrs. theory Hrs. lab
Unit: 9. Occupational Health	Hrs. theory Hrs. lab
Sub-unit: Occupational diseases	Hrs. theory 1 Hrs. lab
1. Describe common occupational diseases in Nepal. 2. Describe the clinical features and causes of these occupational diseases. 3. Describe three forms of prevention of occupational diseases and give an example of each. 4. Analyze different occupational hazards which occur in your own community. 5. Describe the role of the health post manager in preventing occupational diseases.	1. Occupational diseases a) Diseases due to physical agents. b) Diseases due to chemical agents. c) Diseases due to biological agents d) Occupational dermatitis e) Diseases of psychological origin. 2. Prevention of occupational disease: - Medical measures - Engineering measures - Legislation.
Evaluation methods:	Teaching / Learning Activities:
Written examination, Viva, Practical	Classroom instruction, group discussion, field visit, practical

6. Subject: Health Education

Hours Theory: 70
Hours Lab: 30
Assessment Marks: 100

Course Description:

This course teaches the educational aspects of public health management, which is an indispensable component for preventive health, a chief responsibility of the health post manager. The course teaches the concepts and theories of health behaviors and the procedure for planning, implementation and overall management of health education program. The aim of this course is to develop the necessary skills for effective application of health education at the health post level.

Objectives:

Upon completion of the course the learner will be able to:

1. Appreciate the significance of health education in preventive, promotive, curative and rehabilitative health care.
2. Identify and apply the theories and principles of health behavioral sciences in the process of health education.
3. Identify, select and utilize suitable health education methods and media for successful implementation of health service programs.
4. Plan, implement and evaluate health education programs.

Minimum Standards:

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended Textbooks:

1. Pradhan, H.B., A textbook of Health Education. Educational Resources for Health, 1995.
2. Park, J.E. and Park, K., Textbook of Social and Preventive Medicine (15th ed.) 1997.

Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 1. Introduction to Health Education	Hrs. theory Hrs. lab
Sub-unit: Overview of health education	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Discuss the aims of health education. 2. Identify factors which influence health, and will therefore influence health education. 3. Give examples of the way each factor can affect health. 4. Discuss the significance of health education in preventive, primitive curative and rehabilitative health care. 5. Give an example of how health education can help prevent disease. 6. Give an example of how health education helps in curing a disease. 7. Give an example of how health education can prevent disease.	1. The purpose and objectives of health education. 2. Definition of health and education. 3. Factors influencing health: i) Heredity ii) Environment iii) life style iv) socio- economic condition v) health services vi) other related factors.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 1 Introduction to Health Education	Hrs. theory Hrs. lab
Sub-unit: Principles and scope of health education	Hrs. theory 5 Hrs. lab 3
Objectives:	Content:
1. Describe the scope of health education. 2. Explain the principles of health education; give an example for each one. 3. Discuss which heath post staff are responsible for health education. 4. Tell how the health assistant can promote health education at the health post.	1. Scope of health education 2. Principles of health education 3. Persons responsible for health education.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 2 Fundamental Factors of Health Education	Hrs. theory Hrs. lab 10
Sub-unit: Motivation	Hrs. theory 5 Hrs. lab 2
Objectives:	Content:
1. Identify the theories and principles of motivation. 2. Apply the theories and principles of motivation in the process of health education. 3. Give an example of intrinsic and extrinsic motivation. 4. Explain how you might encourage a person to quit smoking by applying the principles of motivation. 5. Tell how to apply a theory of motivation to a health education class on dental care.	1. Meaning and definition of motivation. 2. Kinds of motivation. a. Instinct b. Intrinsic 3. Principles of motivation. - Rosenstock's principle. - Kurt Lewin's principle - Buchman's principle 4. Importance of motivation in health education.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play

Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 2 Fundamental Factors of Health Education	Hrs. theory Hrs. lab
Sub-unit: Learning	Hrs. theory 5 Hrs. lab 2
Objectives:	Content:
1. Describe the steps of the learning process. 2. Discuss factors which increase or decrease learning. 3. Explain the theories and principles of learning. 4. Give an example to illustrate the principle "relevancy improves learning" when teaching the mother of a newborn. 5. Apply other principles of learning to health education situations.	1. Meaning and definition of learning. 2. Steps of learning process. 3. Factors affecting learning: - Biological factors such as age, condition of sensory organs. - Physical factors - Socio-cultural factors - Psychological factors
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 2 Fundamental Factors of Health Education	Hrs. theory Hrs. lab
Sub-unit: Learning	Hrs. theory 4 Hrs. lab 2
Objectives:	Content:
1. Describe the different ways of learning. 2. Identify your own ways of learning. 3. Describe the best way to teach "tooth brushing" to someone who learns by hearing; by seeing; by doing. 4. State Ralph Gary's principle of learning; give an example of this.	1. Ways of learning: - Learning by hearing. - Learning by seeing. - Learning by doing - Learning by repetition - Learning by imitation. 2. Ralph Gary's principle of learning.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 2 Fundamental Factors of Health Education	Hrs. theory Hrs. lab
Sub-unit: Change process	Hrs. theory 5 Hrs. lab 2
Objectives:	Content:
1. Explain the theories of change process. 2. Describe how change process is part of health education. 3. Identify one health behavior which is best changed by force. 4. Identify one health behavior which illustrates a change made by identification. 5. Describe an example of a health behavior change by internalization. 6. Explain why people resist changes. 7. Give examples of overcoming resistance to health behavior change.	1. Concept of change and change process. 2. Ways of bringing change: - Change by force - Change by identification - Change by internalization. 3. Resistance to change. 4. Ways of overcoming the resistances.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play

Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 3 Methods of Health Education	Hrs. theory Hrs. lab 10
Sub-unit: Methods overview	Hrs. theory 4 Hrs. lab 2
Objectives:	Content:
1. Describe the advantages and disadvantages of the different types of health education methods. 2. Select the suitable health education method for successful implementation of selected health education programmes. 3. Describe ways to make each method more successful.	1. Meaning and definition of methods of education. 2. Advantages and disadvantages of each method. 3. Measures to make each method effective. 4. Individual method: Interview Counseling 5. Group method: - Group discussion - Demonstration - Role play - Field trip - Mini-classroom instruction, textbook, handouts, group discussion
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 3 Methods of Health Education	Hrs. theory Hrs. lab 10
Sub-unit: Mass group methods	Hrs. theory 4 Hrs. lab 2
Objectives:	Content:
1. Describe the methods for providing education to large groups of people. 2. Identify the advantages and disadvantages of each method. 3. State the criteria for selecting an appropriate method. 4. Give an example of an appropriate way to use each method in a health education effort.	1. Mass method: - Classroom instruction, textbook. handouts, group discussion - Exhibition - Campaign 2. Criteria for the selection of appropriate methods.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 4. Media of Health Education	Hrs. theory Hrs. lab 10
Sub-unit: Overview of media	Hrs. theory 4 Hrs. lab 2
Objectives:	Content:
1. Describe the advantages and disadvantages of the different types of health education media. 2. Identify criteria used for selecting appropriate media for a method of providing education. 3. Select the appropriate media for health education programmes. 4. Describe how to prepare and use audio and visual aids.	1. Meaning of each media: a. audio aids: radio cassette player. b. visual aids: poster, pamphlet, flip chart, model, real objects, bulletin board, wall chart, photographs, flannel graph. 2. Advantages and disadvantages of each media. 3. Criteria for the selection of media. 4. Process of preparing each media. 5. Measures to use each media effectively.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education - Practical	Hrs. theory Hrs. lab

Unit: 5. Planning of Health Education Programmes	Hrs. theory Hrs. lab
Sub-unit: Principles of planning	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Describe the need for planned health education programmes. 2. Give examples of useful data collection for selecting a needed educational programme. 3. State an example showing how to set priorities of health education needs. 4. Differentiate between general and specific objectives. 5. Describe ways to decide what and how much to teach in an educational programme.	1. Definition concept and importance of planning of health education programme. 2. Steps of planning: a) Collection of data and information b) Identifying health and health education needs on priority basis. c) Setting goals and objectives - General objective - Specific objective. 3. Development of contents.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education	Hrs. theory Hrs. lab
Unit: 5. Planning of Health Education Programmes	Hrs. theory Hrs. lab
Sub-unit: Application of planning	Hrs. theory 4 Hrs. lab
Objectives:	Content:
1. Describe what is meant by "target group" and give an example. 2. Discuss resources available to the health post worker. 3. Explain the importance of making plans with sufficient detail. 4. Identify criteria and methods for evaluating a programme. 5. Use all the components of planning to plan a health education programme.	1. Development of contents to teach 2. Identification of target group. 3. Selection of appropriate methods and media of health education. 4. Identification of necessary and available resources. 5. Development of a detail plan for evaluation. a. time of evaluation. b. criteria of evaluation . c. methods of evaluation.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education - Practical	Hrs. theory Hrs. lab
Unit: 6. Implementation of Health Education Programmes	Hrs. theory Hrs. lab
Sub-unit: Principles of implementation	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. State the strategies of implementation. 2. Give examples of ways to build commitment for a program on vitamin A distribution. 3. Describe ways of training manpower for a program on vitamin A distribution. 4. Identify some local or national resources for a vitamin A distribution program. 5. Tell how a health Assistant might monitor and supervise the activities of workers for the program. 6. Explain why recording and reporting of program results are important.	1. Implementation and its strategies. a) Building commitment b) Training of manpower c) Mobilizing resources d) Organizing community e) Monitoring of the program. f) Supervision of health education workers g) Recording and reporting.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play

Course: Foundations of Health Education - Practical	Hrs. theory Hrs. lab
Unit: 7. Implementation of Health Education Programmes	Hrs. theory 5 Hrs. lab
Sub-unit: Application of the process	Hrs. theory Hrs. lab
Objectives:	Content:
1. Describe the benefits of evaluating a health education program. 2. Explain how the program manager uses each of the stages of evaluation. 3. Give examples of process evaluation and impact evaluation.	1. Definition and meaning of evaluation. 2. Importance of evaluation. 3. Stages of evaluation: - In the beginning (process evaluation) - In the middle of the program. - In the end of the program (impact evaluation).
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education - Practical	Hrs. theory Hrs. lab
Unit: 7. Implementation of Health Education Programmes	Hrs. theory Hrs. lab
Sub-unit: Evaluation of health education program	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Give examples of ways to measure adequacy, relevancy, and efficacy of an educational program. 2. Describe how a program could be found "inappropriate" by an evaluator. 3. Discuss advantages and disadvantages of each method of evaluation. 4. Apply the process of evaluation to a simulated or real educational program.	1. Criteria of evaluation: - Adequacy - Relevancy - Efficacy - Appropriateness 2. Methods of evaluation: - Interview - Observation - Study of office records and reports - Meeting and discussion. - Process of evaluation - Formulating the objectives of evaluation - Determining proper methods and developing appropriate tools of evaluation. - Collecting the information and data. - Analyzing and interpreting. - Providing recommendations and suggestions.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education - Practical	Hrs. theory Hrs. lab
Unit: 7. Implementation of Health Education Programmes	Hrs. theory 5 Hrs. lab
Sub-unit: Health education material	Hrs. theory Hrs. lab
Objectives:	Content:
1. Collect health education materials from different organizations. 2. Prepare simple media for health education a. Poster b. Pamphlet c. Flip chart d. Flannel graph	1. Resources for community education materials. 2. Procedures for developing simple media.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Foundations of Health Education - Practical	Hrs. theory Hrs. lab
Unit: 7. Implementation of Health Education Programmes	Hrs. theory Hrs. lab

Sub-unit: practice of health education methods	Hrs. theory 5 Hrs. lab
Objectives:	Content:
1. Identify the important characteristics of the following health education methods in the classroom. 2. Practice using these methods in the laboratory setting. 3. Use these one or more of these methods effectively in the health education program: a. Counseling b. Group discussion c. Role play d. Demonstration e. Classroom instruction, textbook. handouts, group discussion f. Exhibition.	1. Apply theory learned from previous lessons.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play
Course: Practice of Health Education	Hrs. theory Hrs. lab
Unit: 7. Implementation of Health Education Programmes	Hrs. theory 5 Hrs. lab 30
Sub-unit: Application of the health education process	Hrs. theory Hrs. lab
Objectives:	Content:
1. Use the planning and implementation process to develop a health education program for a selected problem. a) Conduct education diagnosis survey to identify the health education need of the selected community. b) Prepare a modular health education plan for deliberation of health education in selected community or health post. - Set goal and objectives of the health education program. - Development of contents of messages of the health education. - Identification of the target group - Selection of appropriate methods and media of health education. - Identify of necessary and available resources for the health education program. - Development of a detail plan for evaluation of the health education program. c) Conduct health education sessions in the community and health post. d) Evaluate the health education sessions. e) Follow up for ensuring the most effectiveness of the program.	1. Apply theory learned in previous lessons to health education programes in selected health problems: a) Communicable diseases- malaria, tuberculosis, parasitic diseases. b) Malnutrition c) Breastfeeding d) Diarrhoea, e) Acute respiratory infections f) Family planning g) Immunization h) Child survival i) Maternal health j) Environmental sanitation problems. k) Alcoholism and drug abuse l) STDS and HIV/AIDS m) Accident prevention n) Health education during disasters and epidemics o) School health.
Evaluation methods: written examination, viva, community project performance	Teaching / Learning Activities: classroom instruction, textbook self-study, handouts, group discussion, role play

7. Subject: Health Management

Hours Theory: **110**
Hours Practical: **30**
Assessment Marks: **100**

Course Description:

This course introduces the student to concepts about management of health care services, as it applies to the operations of a Health Post or Primary Health Care Center. This course teaches about the health care system in Nepal, fundamental principles of management, national health policy and health programmes, health manpower in Nepal, health related organizations and agencies, logistics management, leadership and personnel management, health issues and professional practice. The student will acquire the necessary knowledge and skill to deal effectively with the diverse challenges of health service management.

Course Objectives:

On completion of the course the student will be able to:

1. Identify health care systems in Nepal.
2. Explain the theories, principles and components of health management.
3. Describe the national health policy, tell its philosophy, and identify its strengths and weaknesses.
4. Explain various health programmes of the Department of Health Services.
5. Apply the principles of logistics management and quality assurance to health post management.
6. Apply the principles of supervision and leadership to management of Health Post staff.
7. Manage a health post in the real setting.
8. Identify the different levels of health manpower in Nepal and describe the functions of the Health Manpower Development Institute.
9. Explain the goals and functions of the health related governmental organizations, non-governmental organizations (NGO's), international non-governmental organizations (INGO's) and international agencies which serve in Nepal.
10. Identify current national and international health issues.
11. Explain the code of ethics of the Health Assistant.

Minimum Standards:

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

Recommended Texts:

1. Macmohan, R. et al. On Being In Charge, A guide to Management in Primary Health Care. WHO. Current edition.

2. Dixit, H. The Quest for Health. Educational Enterprise, (P) Ltd., Kathmandu. 1999.

3. Pradhananga, Y. Health Management. Council for Technical Education and Vocational Training, Bhaktapur, Nepal. 2055B.S.

4. Kamala, T. & Bishnu, R. Leadership and Management for Nurses. Health Learning Materials Centre, Tribuvan University, Kathmandu. 1990.

Reference Texts:

1. Shrestha, B.M. Basic Principles of Management. Akshyulak Publication, Nepal. 2039B.S.

2. Modern Management Methods and the Organization of Health Services, Public Health Papers #55. WHO. 1974.

3. Inventory Control and Basic Logistics Procedure Manual on Store Management for PHC/HP and SHP Personnel. HMG/JSI. 2054B.S.

5. Park, K. Textbook of Preventive and Social Medicine. Bhandrasidas Bhanot, Jabalpur, India. 2000.

6. Health Logistics Procedure Manual. NHTC/LMD/USAID JSI, Nepal 2057.

7. Health Statistics and EPI Cold Chain Management Procedure Manual. NHTC/LMD/USAID JSI, Nepal 2057.

Course: Health Management	Hrs. theory	Hrs. lab
Unit:1. Health care system in Nepal	Hrs. theory 6	Hrs. lab
Sub-unit:	Hrs. theory 6	Hrs. lab
Objectives:	Content:	
1. Define "health care system" and tell the purpose and characteristics of a health care system. 2. Describe the history of the development of health services in Nepal. 3. Describe ayurvedic, homeopathic and allopathic approaches to health care. 4. Identify situations when the most appropriate type of treatment might be ayurvedic care, homeopathic care, allopathic care, or a combination of these.	1. The definition, characteristics, and purpose of a health care system. 2. History of health system in Nepal. 3. Health care approaches: • Ayurvedic • Homeopathic • Allopathic 4. Philosophy, origin, strengths and weaknesses of these health care approaches.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," classroom instruction	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 2 Fundamentals of Health Management	Hrs. theory 26	Hrs. lab
Sub-unit: Introduction to Health Management	Hrs. theory 2	Hrs. lab
Objectives:	Content:	
1. Define management and health management 2. Differentiate between "set^{n}" management & administration. 3. Describe the function of management.	1. The definitions of management & health management. 2. Concepts of management versus administration. 3. The POSDCORB function of management in the Health Post context.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," - Instructor led discussion, reference study assignment	
Course: Health Management	Hrs. theory	Hrs. lab

Unit: 2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Planning of Health service	Hrs. theory 3	Hrs. lab
Objectives:	Content:	
1. Describe the process and purpose of planning. 2. Describe different types of planning. 3. Explain the planning cycle. 4. Describe the steps of planning. 5. Explain the health planning system in Nepal.	1. Definition of planning. 2. Types of planning.. 3. Planning cycle (PIE cycle) 4. Planning steps. 5. Current health planning system of Nepal.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," classroom instruction	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Organizing of Health Service	Hrs. theory 3	Hrs. lab
Objectives:	Content:	
1. Describe the process and purpose of organization. 2. Identify different types of health service organizations. 3. Explain the different types health service in Nepal.	1. Definition of organization. 2. Types of organizations and their organograms. 3. Organograms of MoH, DoHS, PHCC, HP, SHP, others.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Principles of leadership	Hrs. theory 4	Hrs. lab
Objectives:	Content:	
1. Discuss the characteristics and advantages/disadvantages of each of the leadership styles: - autocratic - democratic - laissez faire 2. Explain why an autocratic leadership style has historically been most commonly used in Nepal. 3. Discuss ways that the Health Post Manager builds mutual respect and trust with the health post staff. 4. Describe indications that low motivation exists among a health post staff. 5. Discuss strategies to increase staff motivation by applying theories of motivation. 6. Apply the theories of change to a situation of high absenteeism among health post staff. 7. Discuss the importance of having written policy for health post staff.	1. Characteristics, benefits and disadvantages of styles of leadership, circumstances when each style is most appropriate. 2. relationship between chosen leadership styles and cultural history (feudalism, recent development of representative government) 3. Responsibility of the leader as role model; ways to demonstrate consistency, transparency, integrity and fairness. 4. Characteristics and remedies for low motivation of workers. 5. Theories of motivation and change: Maslow, Lewin. 6. Principles of management by policy.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, discussion, field visit	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Staffing	Hrs. theory	Hrs. lab
Objectives:	Content:	
1. State the purpose of using a job description. 2. Identify the elements of a job description.	1. Definition and purpose of a job description. 2. Essential elements of a job description.	

3. Identify the staffing patterns of different health institutions Nepal 4. Describe the educational preparation or specialized training of each member of the health post staff. 5. tell why you support or disagree with the statement, "experienced staff are experts in their role."	3. Staffing patterns of a Primary Health Care Center, Health Post, and Sub Health Post.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Directing	Hrs. theory 6	Hrs. lab
Objectives:	Content:	
1. Describe the meaning and purpose of delegation of authority. 2. Discuss the relationship between delegation and authority. 3. Identify the process and limits of delegation. 4. Define supervision and describe types of supervision and their components.	1. Delegation of authority and its process.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:2. Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Supervision	Hrs. theory 3	Hrs. lab
Objectives:	Content:	
1. Describe the objectives and methods of supervision. 2. Identify different types of tools use in supervision. 3. Describe the process of supervision. 4. Explain the purpose and process of monitoring by a supervisor. 5. Describe methods of monitoring. 6. Identify steps of a monitoring program. 7. Describe the purpose and processes of different types of evaluation by a manager.	2. Supervision, its component tools, methods, objectives and process. 3. Monitoring and its methods. 4. Purposes and types of evaluation. .	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge", Classroom instruction, field visit	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Coordination	Hrs. theory 3	Hrs. lab
Objectives:	Content:	
1. Define coordination in terms of health management. 2. Identify different types of coordination. 3. Identify the techniques and processes of coordination. 4. Explain why different types of coordination are used at the Health Post level.	1. Definition of coordination. 2. External and internal coordinating. 3. Techniques and processes of coordination. 4. Selecting styles of coordination in Health Post level.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit	

Course: Health Management	Hrs. theory Hrs. lab
Unit: 2 Fundamentals of Health Management	Hrs. theory Hrs. lab
Sub-unit: Disaster coordination	Hrs. theory 2 Hrs. lab
Objectives:	Content:
1. Discuss historical events and potential for future disasters from these causes: earthquake, flooding, nuclear explosion. 2. Identify the health risks created by each of these disasters. 3. Describe the policies and procedures developed by the earthquake preparedness committee in Kathmandu. 4. Identify the major points of the national guidelines for disaster management. 5. Identify the civil organizations of a community that would have chief responsibility for preserving community welfare in a disaster situation. 6. Describe the role of the health post manager in coordinating a disaster preparedness response.	1. Historical events and potential for future disasters from earthquakes, flooding and nuclear explosion. 2. Risks to public health created by these disasters. 3. National activities for earthquake preparedness. 4. National guidelines for the management of major flooding or nuclear fallout. 5. Coordination of community resources and leadership responsibility for disaster management.
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit

Course: Health Management	Hrs. Theory Hrs. Lab
Unit: 2 Fundamentals of Health Management	Hrs. Theory Hrs. Lab
Sub-unit: Reporting	Hrs. Theory 2 Hrs. Lab
Objectives:	Content:
1. Discuss the purpose of health post reporting. 2. Describe the qualities of an effective Health Post report. 3. Prepare a simulated health post report from a case example. 4. Describe the process of health reporting in Nepal.	1. Definition and purpose of reporting. 2. Techniques and characteristics of report writing: complete, accurate, sequential, timely, understandable. 3. Reporting process of Nepal's health delivery system.
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit

Course: Health Management	Hrs. theory	Hrs. lab
Unit: 2 Fundamentals of Health Management	Hrs. theory	Hrs. lab
Sub-unit: Budgeting	Hrs. theory 2	Hrs. lab
Objectives:	Content:	
1. Discuss the purpose for using a budget in health management. 2. Identify and compare different types of budgets.	1. Budgeting functions 2. Types of budgets and characteristics of various budgets. 3. Features of the existing health budgeting system of Nepal.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: classroom instruction, textbook self study - "On Being in Charge,"	

Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory 29	Hrs. lab
Sub-unit: Training	Hrs. theory 6	Hrs. lab 4
Objectives:	Content:	

1. State the purpose and definition of training. 2. Describe different types of training and tell the advantages and disadvantages of each. 3. Explain the process for assessing the need for training. 4. describe how to plan, conduct & evaluate the training program of subordinate & volunteers	1. Definition of training. 2. Different types of training. 3. Training Need Assessment (TNA). 4. Training plan, training conduction & training evaluation.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, field visit	
Course: Health Management	Hrs. theory	Hrs. lab
Unit : 3 Health post Management	Hrs. theory	Hrs. lab
Sub-unit: Conduct staff meeting	Hrs. theory 3	Hrs. lab 2
Objectives:	Content:	
1. Describe how to identify the need for a meeting. 2. Tell how to decide what to include on a meeting agenda. 3. Describe how to plan for an effective meeting. 4. Describe the strategies for conducting and effective meeting. 5. Discuss the importance of minuting the decisions made by the meeting. 6. Describe how to formalize the minutes.	1. Importance of maintaining good communication through meetings. 2. Planning and organizing a meeting. - Identify the date, time, and venue for the meeting. - Identify the participants and resources. - Circulate the invitation letter to participants. 3. Writing invitation letters. 4. Steps for conducting meeting. - Staying on task per the agenda. - Maintaining ground rules for respectful interactions. - Elicit participation from all members. - Seek consensus on decisions. 5. minuting procedure 6. Following concerned organization rules.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Samples of meeting minutes/invitation letters, practice writing minutes from a simulated meeting Classroom instruction, Demonstration / Practicum	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health post Management	Hrs. theory	Hrs. lab
Sub-unit: Financial Management	Hrs. theory 2	Hrs. lab 2
Objectives:	Content:	
1. Discuss the purpose and procedures for financial management. 2. Prepare an annual budget from a simulated example. 3. Demonstrate how to maintain records of income and expenditure. 4. Demonstrate how to prepare monthly / quarterly and annual financial statements. 5. Describe how to maintain a bank account.	1. Principles of financial management 2. Using a voucher. 3. Using a budget sheet. 4. Procedure for maintaining cash book (HMG rules).	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," classsroom practice, classroom instruction, field visit	

Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Leave Management	Hrs. theory 1	Hrs. lab 1
Objectives:	Content:	
1. Identify different types of employee leaves. 2. Describe the procedure for making a request for leave. 3. Demonstrate how to maintain records of staff leave. 4. Discuss the reasoning used before giving approval of staff leave.	1. Existing by laws of concerned organizations regarding employee leave.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, observation in practicum, Resources - existing related laws	

Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Logistic Management	Hrs. theory 3	Hrs. lab 2
Objectives:	Content:	
1. Explain the purpose of logistics management. 2. Describe the Logistic Management Information System (LMIS) practiced in Nepal. 3. Describe the "six rights" of logistic management. 4. Explain logistic cycle. 5. Describe the procedure for using the various records and forms of the LMIS.	1. Definition and function of logistic management. 2. Components and procedures of Nepal's LMIS. 3. Six" rights of logistic management. 4. Logistic cycle (Serving customer, product selection forecasting and procurement and inventory management). 5. Procedures for LMIS forms and records use (AGF# 45, 46, 47, 48, 49, 50, 51, 52 & 57).	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, group discussion, Resources: booklets for process of filling logistics related forms, actual logistic forms.	
Course: Health Management	Hrs. theory	Hrs. lab
Unit 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Inventory management	Hrs. theory 2	Hrs. lab 1
1. Describe the purpose and process of physical inventory. 2. Differentiate between expendable and non-expendable goods. 3. Define storage and store standard. 4. Describe the procedure for Cold Chain storage of medical supplies. 5. Discuss the essential data of logistics information. 6. Describe the process of calculating and demanding items, for both regular and emergency needs. 7. Describe the process of distributing commodities. 8. Describe the process of auctioning, disposing and write off according to current HMG regulations.	1. Inventory goals and procedures. 2. Classifications of materials. 3. Specialized storage treatment for vaccines, essential drugs, contraceptives, equipment/instruments. 4. Essential data concepts: a. Maximum/minimum stock levels b. Authorized stock level and emergency order point c. Lead time stocking d. Losses/adjustments 5. Emergency and regular calculation and procurement of commodities. 6. Procedures for distribution of commodities. 7. HMG regulations for auctioning, disposing and writing off of goods.	
Examination methods: written exams (short answer questions	Teaching / Learning Activities: Classroom instruction, discussion, Acts and Regulations related to financial and administrative matters.	

Course: Health Management	Hrs. theory	Hrs. lab _____
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab _____
Sub-unit: Quality assurance	Hrs. theory 2	Hrs. lab 2
Objectives:	Content:	
1. Compare different definitions of quality health care. 2. Identify reasons for using the quality assurance (QA) program. 3. Identify the chief characteristics of a quality assurance program. 4. Define the term "standards" and give examples of health care standards. 5. List the ways that standards help to close the gap between actual performance and desired outcomes. 6. Give examples of ways to reduce the costs caused by poor quality health care. 7. Give examples of ways to improve patient satisfaction with services. 8. List the 4 "focus areas" of quality assurance principles. 9. Explain why the process of quality assurance is viewed as a cycle. 10. Use the methods and principles of QA to identify and plan a solution to a real health care problem.	1. Components and concepts of quality health care. 2. Rationale for quality assurance implementation. 3. Characteristics of quality at the health post: a. technical competence b. effective service c. efficient service d. accessible site e. good interpersonal relationships f. good continuity of services g. safe environment h. pleasant environment 4. Using standards to improve service: a. Write standards (performance rules/measurements) for quality health care. b. Communicate these standards to all workers. c. Plan ways to regularly check if standards are being met. d. Identify and solve the problems that interfere with "high standard quality." 5. The focus of quality assurance principles: a. focus on patient/staff needs b. focus on how things are done (process/systems) – do not blame the individual. c. focus on facts (don't make assumptions or guesses). d. Focus on team approach to problem solving. 6. The cycle of quality improvement.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, group discussion, practice exercises.	
Course: Health Management	Hrs. theory	Hrs. lab _____
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab _____
Sub-unit: Performance Evaluation of Staff	Hrs. theory 2	Hrs. lab 2
Objectives:	Content:	
1. Discuss the purposes and benefits of regular staff performance evaluations. 2. Explain the importance of writing a clear and complete staff job description. 3. Develop staff job descriptions for a simulated example. 4. Develop a staff performance evaluation checklist	1. Importance of staff performance evaluation. 2. Performance evaluation indicators. 3. Staff, performance appraisal formats. (Designed by concerned institute / organization.).	

based on the job description. 5. Describe how to effectively give a job assignment. 6. Identify indicators of a good job performance. 7. Role-play ways to counsel the staff who has poor job performance.		
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, practice	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Space Management	Hrs. theory 2	Hrs. lab 2
Objectives:	Content:	
1. Discuss how to assess workspace required for various Health Post activities. 2. Demonstrate how to arrange a flow chart of each activity. 3. Describe ways to arranging space as per activities. 4. Demonstrate how to make a map of a catchment area.	1. Strategies for management of activities of the Health Post. 2. District wide involvement in the catchment area. 3. Procedures for mapping the geographical situation of the Health Post and catchment area together with relevant health related information.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, Practicum, field visit to institution, Classroom practice	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Time Management	Hrs. theory 2	Hrs. lab 2
Objectives:	Content:	
1. Describe how to compute staff work load. 2. Demonstrate how to prepare a timetable of health unit activities. - Weekly - Monthly - Quarterly - Yearly 3. Demonstrate how to prepare a program chart. 4. Demonstrate how to prepare a yearly calendar of operation.	1. Concept of time management. 2. Ways to plan for various activities of the Health Post.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, Practicum, visit institution, Classroom practice.	

Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Letter Writing	Hrs. theory 2	Hrs. lab 1
Objectives:	Content:	
1. Identify different types of letters and discuss the purposes of each. 2. Identify the good and poor attributes of a letter. 3. Write selected official letters based on a simulated example.	1. Definition of letters and its types. 2. Official letters that use in government sector especially in health post. 3. characteristics of effective letters: - clear meaning - respectful - complete in information	

	- accurate - timely - grammatically correct - includes where/how to respond	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, Practicum, visit institution, Classroom practice	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Problem solving	Hrs. theory 2	Hrs. lab 1
Objectives:	Content:	
1. Define problem and problem solving. 2. Identify steps of problem solving. 3. Apply the steps of problem solving to a real or simulated case. 4. Describe common mistakes of using the problem solving method.	1. Problem and problem solving. 2. Steps of problem solving. - Selection of problem - Define the problem - Collecting relevant data - Interpretation of data - Drawing conclusion - Application of solution - Evaluation of the application	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - "On Being in Charge," Classroom instruction, Practicum, visit institution, case study	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 3 Health Post Management	Hrs. theory	Hrs. lab
Sub-unit: Health Management Information System (HMIS)	Hrs. theory 3	Hrs. lab 8
Objectives:	Content:	
1. Explain the purpose of the HMIS. 2. Identify the important benefits of this system. 3. describe process of HMIS 4. Explain the use of the different types of HMIS forms. 5. Describe the use of the HMIS records and reports. 6. Demonstrate how to prepare monthly, quarterly, and annual HMIS reports.	1. Function and purpose of MIS and HMIS. 2. importance of HMIS 3. The Process of HMIS with example of national system. 4. Application of the HMIS forms. 5. Differences between types of records and reports. 6. Monthly, quarterly & annual health reporting system.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Text book self study, Classroom instruction, classroom practice, field visit to relevant health institutions	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 4 Health related organization	Hrs. theory 8	Hrs. lab
Sub-unit: International Non-Governmental Organizations (INGO's)	Hrs. theory 2	Hrs. lab 5
Objectives:	Content:	
1. Identify the activities and goals of INGO's working in health sectors. 2. Identify their role in promoting the health care system.	1. INGO's: SCF (US), SCF (UK), CARE Nepal, PLAN Nepal. 2. Roles and activities of INGO's .	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, filed visit to concerned organization	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 4 Health related organization	Hrs. theory	Hrs. lab

Sub-unit: National Non-Governmental Organizations (NGO's)	Hrs. theory 2	Hrs. lab 5
Objectives:	Content:	
1. Identify the activities and goals of NGOS working in health & health related sector. 2. Identify their roles in promotion of the health care system.	1. National NGOS: FPAN, NRCS, Nepal Netrajyoti sangh, Leprosy relief association, NATA, others. 2. Roles and activities of non-governmental organizations.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, filed visit to concerned organization	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:4 Health related organization	Hrs. theory	Hrs. lab
Sub-unit: International Agencies	Hrs. theory 2	Hrs. lab 6
Objectives:	Content:	
1. Identify international bilateral & multilateral agencies. 2. Identify their roles and activities in health sectors.	1. Different bilateral & multilateral agencies like, WHO, Unicef, UNDP, World Bank, DFID UNFPA, FAO.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, field visit, brochures of concerned agencies	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:5 National Health Policy and Health Programs	Hrs. theory 13	Hrs. lab
Sub-unit: Various Health Programmes	Hrs. theory 10	Hrs. lab 2
Objectives:	Content:	
1. Identify the objectives and activities of national health programmes. 2. Participate in two or more of these programs. 3. Discuss ways the Health Post manager can promote the use of these national health programs.	1. National health programs including: Malaria control program FP / MCH Tuberculosis control program Leprosy control EPI IEC CDD ARI Nutrition program Training Program Kala – azar STD / HIV / Aids Community Drug Programme (CDP) Community drug programme. FCHV / TBA Primary Health Center-Outreach Clinic (PHC–ORC) (PHC, outreach clinical)	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Text book self study "On being in charge," classroom instruction, field visit to selected divisions of D.H.S., DOHS annual report, National Planning System in Health Section.	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:6 Health Manpower in Nepal	Hrs. theory 8	Hrs. lab
Sub-unit: Development of Human Resources in Health (HRH) in Nepal	Hrs. theory 2	Hrs. lab 6

Objectives:	Content:	
1. Describe the purposes and activities of the various institutions involved in HRH Development.	2. Various institution involved in HRH development like, Institute of Medicine, Tribuvan University Council for Technical Education and Vocational Training Kathmandu University B.P. Koirala Institute for Health Sciences National Health Training Center (NHTC)	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, relevant literature and brochures of concerned institutions, field visit to selected divisions of D.H.S.	
Course: Health Management	Hrs. theory	Hrs. lab
Unit:6 Health Manpower in Nepal	Hrs. theory	Hrs. lab
Sub-unit: Human Resources for Health (HRH)	Hrs. theory 6	Hrs. lab 6
Objectives:	Content:	
1. Identify the different existing HRH in Nepal. 2. Describe the role of each kind of staff member at a Health Post. 3. State the job descriptions of staff at the Health Post / Sub Health Post levels.	1. HRH positions in Nepal: Medical Doctor, Doctor of Philosophy, Public Health Worker, Health Assistant, Staff Nurse, Auxiliary Nurse Midwife, Auxiliary Health Worker, Lab Technologist, Radiographer, others. 2. Administrative and technical staff of the health post. 3. Responsibilities of staff of Health Post / Sub Health Post.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: classroom instruction, field visit.	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 6 National Health Policy Health Programs	Hrs. theory 3	Hrs. lab
Sub-unit: National Health Policy	Hrs. theory 3	Hrs. lab
Objectives:	Content:	
1. Describe components of the National Health Policy 1991. 2. Describe the current five-year plan. 3. Describe Nepal's long term health plan. 4. Discuss potential barriers to successful achievement of these goals, and ways to overcome such barriers (for example, the "barrier" of insufficient health care manpower).	1. National Health Policy 1991. 2. Tenth five-year plan. 3. Second long term health plan. 4. Health indicators. 5. Barriers to the development of health care services.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, field visit, annual report of DOHS	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 7. Health Issues & Professional Practice	Hrs. theory 9	Hrs. lab
Sub-unit: Global Health Issues and Situations	Hrs. theory 3	Hrs. lab 1
Objectives:	Content:	
1. Discuss how health problems have affected mankind in history. 2. Identify important global health issues today.	1. Global health issues and situations.	

3. Describe global efforts to improve the health and nutrition of developing nations. 4. Discuss barriers to the development of global health throughout the world. 5. Analyze the global health situation. - How will the reduction of mortality from infectious diseases affect the populations of developing nations? - Has the development of genetically altered grains helped or worsened nutrition in developing nations? - What are the major health problems of the first world countries?		
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: Classroom instruction, case study, brochures and handouts about UNICEF, State of World Children and Women.UNICEF	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 7. Health Issues & Professional Practice	Hrs. theory	Hrs. lab
Sub-unit: National Health Issues & Situations	Hrs. theory 3	Hrs. lab 1
Objectives:	Content:	
1. Identify the most important health issues of Nepal. 2. Describe how these health issues came about, and what measures are being made to correct them. 3. Compare the health situation of Nepal, as it was 20 years ago, and as it is today. 4. Analyze the reasons for the differences in health care in Nepal from 20 years ago and today. 5. Analyze how global events have affected the health situation of Nepal, both the positive effects and negative effects.	1. The history of health in Nepal and factors which have affected the quality of health. 2. Review last and current five years plan national planing commission report on health.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study, plan of national planning commission classroom instruction.	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 7. Health Issues & Professional Practice	Hrs. theory	Hrs. lab
Sub-unit: Professional Practice	Hrs. theory 3	Hrs. lab 0
Objectives:	Content:	
1. Define and describe the code of conduct for Health Assistants. 2. Explain the purpose of a code of conduct. 3. Describe the formation, activities and functioning of the Nepal Health Professional Council (NHPC).	1. Code of conduct. 2. Formation, activities & functions of NHPC.	
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study, NHPC Act, classroom instruction.	
Course: Health Management	Hrs. theory	Hrs. lab
Unit: 7. Health Issues and Professional Practice	Hrs. theory	Hrs. lab
Sub-unit: Entrepreneurship	Hrs. theory	Hrs. lab
Objectives:	Content:	
1. Discuss the concept of entrepreneurship. 2. Discuss how the community and Health Post might benefit if the Health Post Manager began a	1. Goals and process of small business establishment and management. 2. Complimentary goals of small business	

private profit making business in addition to his role as Health Post manager. 3. List types of businesses a Health Post Manager might operate. 4. Identify the potential opportunities for unethical actions to occur when the Health Post Manager works simultaneously at two jobs. 5. Discuss ways to prevent unethical occurrences by the Health Post Manager/entrepreneur.	and community welfare. 3. Business opportunities which meet community needs. 4. Ethical considerations of entrepreneurship and Health Post Manager role. 5. Principles for moral examination to avoid conflict of interest situations
Examination methods: written exams (short answer questions)	Teaching / Learning Activities: textbook self study - “On Being in Charge”, Classroom instruction, field visit

8. Subject: Social studies:

Hours Theory: 80
Assessment Marks: 50

Course Description

This course offers an introduction to Nepal in general. It provides basic information about the geography, natural resources, history, society, culture, politics, economy, and foreign policy of Nepal. Analyses of current social and national problems are discussed with relation to these country features.

Course Objectives

On completion of this course the student will be able to:

Identify the climate, geography, natural resources and administrative units of Nepal.
Summarize the history of Nepal.
Describe the arts and cultural achievements of Nepal.
Explore the social problems challenging Nepal today.
Analyze the salient features and difficulties of Nepalese economic development.
Distinguish between democratic and non-democratic forms of government.
Examine the features of the constitution f the Kingdom of Nepal, 1990.
Identify the chief characteristics of Nepal's foreign policy.
Describe Nepal's role in the peace-keeping efforts of the world.
Summarize the political development in Nepal.

Minimum Standards

Students must achieve a minimum of 40% accuracy in theory, 60% accuracy in practical.

References

Faces of Nepal, Jagadamba Press.
Bista, Dor Bahadur, People of Nepal
Bista Dur Bahadur, Sabai Jalko Fulbari

Course: Social Studies	Hrs. theory 80
Unit: 1 Introduction	Hrs. theory 10
Sub-unit: The land of Nepal	Hrs. theory 10
Objectives:	Content:
Locate and discuss the state of Nepal in relation to the continents and countries of the world. Describe the geographical divisions of Nepal. Identify the administrative units of Nepal. Compare the ecological, climactic, and regional diversities in Nepal. Describe the natural resources of Nepal.	Geographical locations, diversities, and unique characteristics of Nepal. Geographical divisions of Nepal: a. ecologic climactic rivers vegetation administrative Natural resources of Nepal (general introduction). Patterns of land use in Nepal.
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion, textbook self-study.

Course: Social Studies	
Unit: 2 Political History of Nepal	Hrs. theory 16
Sub-unit: Ancient and medieval Nepal	Hrs. theory 6
Objectives:	Content:
Discuss the historical events of the ancient period. Explain the contributions of Manadeva, Amshuvarma and Narendradeva. Explain why the period of Lichhavi rule is known as the golden period. Summarize the brief history of Doya, Kasha, and Malla kingdoms. Evaluate the contributions of Jayasthiti Malla, Yakbha Malla, Pratap Malla, Siddhinarshing Malla and Bhupatindra Malla. Summarize the history of Gorkha and point out the reforms of Ram Shah.	Ancient Nepal: origin of the word Nepal ancient dynasties: Gopal, Mahispal, Kirat, Janak, and Sakhaya rise and contributions of Manadav, Amshuvarma, Narendradeva reforms of Licchavi period (Licchavi civilization). Medieval Nepal: Rajya or Karnatac kingdom of Karnali region kingdom of Kathmandu valley d reforms of Jayasthiti Malla and Yaksha Malla butions of Siddhinarshing Malla tindra Malla and Pratap Malla Rise of Gorkha as an independent state, Ram Shah and his reforms.
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion, textbook self-study.
Course: Social Studies	
Unit: 2 Political History of Nepal	
Sub-unit: Unification of Nepal	Hrs. theory 5
Objectives:	Content:
Describe the geographical fragmentation of Nepal in the later medieval period. Identify the causes of geographical fragmentation. Explain the political, social, economic and geographical situation of Nepal just before the enthronement of Prithvi Narayan Shah. Analyse the policies adopted by Prithvi Narayan Shah and his successors during the time of unification. Identify the factors which influenced the rise of the Ranas.	Petty states of Nepal (Baisi, Chaubisi), states in Kathmandu valley, three Sena states of eastern Nepal. Political, social, economic and geographical conditions of Nepal before Prithvi Narayan Shah. Unification of Nepal: role of Prithvi Narayan Shah, Rajendra Laxmi, Bahadur Shah, and Bhim Sen Thapa. Political instability and rise of Jang Bahadur: conspiracies, assassinations, Kot Massacre, Bhandarkhat Parva, Alau Parva.
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion.
Course: Social Studies	
Unit: 2 Political History of Nepal	
Sub-unit: Rana period and rise of democracy	Hrs. theory 5
Objectives:	Content:
Explain the social, economic and administrative reforms of the Rana period. Analyse the anti-Rana movement and discuss the causes of the revolutions of 2007 B.S. Evaluate the democratic exercise of Nepal during 2007-2016 B.S. Assess the works of the first elected	Reforms of the Ranas: social, economic, and administrative. Anti-Rana movement: Prachandra Gorkha Library episode Parja Parishad Nepali Congress Influencing factors of the revolution of 2007 B.S.

government of Nepal. Identify the characteristics of the panchayat system. Examine the people's movement of 2046 B.S. and its impacts. Summarize the characteristics of the constitution of the Kingdom of Nepal, 1990. Discuss the impact of recent political events on the social conditions of Nepal.	Political instability and the election of 2015 B.S.; formation of Nepali Congress government and its reforms. End of multiparty system and rise of panchayat; characteristics of panchayat system. People's movement of 1990 A.D. and characteristics of the constitution of the Kingdom of Nepal 2046 B.S. The impact of recent political events on Nepali society.
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion.
Course: Social Studies	
Unit: 3 People, Society & Culture	Hrs. theory 14
Sub-unit: Development of Nepalese culture and society	Hrs. theory 7
Objectives:	Content:
Analyze the population growth of Nepal: contributing factors and effects on society. Discuss the contributing factors and solutions to the chief social problems of Nepal. Describe the origin of the caste system in Nepal and current laws about cast practice. Discuss the establishment of our national language. Discuss the use of ethnic languages. Compare the different cultural habits of Nepal.	Population growth in Nepal, fertility, mortality, and migration. Development of different caste beliefs in Nepal and laws related to the caste system; History of development of our national language, other languages, and their literature: Nepali Newari Sanskrit Maithili Social problems: Poverty Gender issues Unemployment Drug addictions HIV/AIDS Prostitution Child labor Trafficking Other Cultural heritages in Himalayan, Hilly and Terai regions: Food habits Dress and ornaments Festivals and temples Music, songs and dances Occupations
Evaluation methods: written exam	Teaching / Learning activities and resources: classroom instruction and discussion, textbook self-study.
Course: Social Studies	
Unit: 3 People, Society & Culture	
Sub-unit: Arts and religion	Hrs. theory 7
Objectives:	Content:
Analyze the cultural heritage of Nepal. Discuss the development of arts in Nepal. Explain the history of religious harmony in Nepal.	Art in Nepal: paintings, sculpture and architecture in ancient, medieval and modern times. Religions in Nepal: Hinduism Buddhism Muslim

	Kirat Christian
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion.
Minimum Standards: theory – 40%, lab 60 % accuracy by end of the course.	
Course: Social Studies	
Unit: 4 Nepalese Economy	Hrs. theory 14
Sub-unit: Resources and development	Hrs. theory 7
Objectives:	Content:
Analyse the difficulties of Nepalese economic development. Explain the various aspects of Nepal's economic system.	Issues affecting the economic development of Nepal: poverty, inequality, population growth, unemployment, regional disparities and land tenures. Features of the Nepalese economic system: agriculture and land reform system cottage and large scale industries internal and external trade tourism cooperation planned economy mixed economy (capitalism and socialism)
Evaluation methods: written exam	Teaching / Learning activities and resources: classroom instruction and discussion, textbook self-study.
Course: Social Studies	
Unit: 4 Nepalese Economy	
Sub-unit: Natural resources	Hrs. theory 7
Objectives:	Content:
Discuss the appropriate use of resources in the economic success of Nepal.	Sources of national development: Human resources Forests Land Water Minerals
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion.
Minimum Standards: theory – 40%, lab 60 % accuracy by end of the course.	
Course: Social Studies	
Unit: 5 Politics and Government	Hrs. theory 14
Sub-unit: Democratic constitution	Hrs. theory 7
Objectives:	Content:
Distinguish between a democratic and non-democratic form of government. Examine and explain the salient features of the constitution of the Kingdom of Nepal 1990 (2047 B.S.)	Meaning and definition of democracy; characteristics of democratic government; meaning of non-democratic government. Features of the constitution of 1990: Legislative (upper house and lower house) composition, power and functions. Executive (His Majesty and Council of Ministers) composition, power and functions. Judiciary (courts – Supreme Court, appeals courts, district courts) composition, power and functions of judiciary. Fundamental rights and duties of people.

	Other features – election commission, emergency provisions, and constitutional amendments.
Evaluation methods: written exam	Teaching / Learning activities and resources: classroom instruction and discussion, textbook self-study.
Course: Social Studies	
Unit: 5 Politics and Government	
Sub-unit: Democratization and decentralization	Hrs. theory 7
Objectives:	Content:
Describe the role of political parties for democratization in Nepal; assess their effectiveness. Explain decentralization and local level governments of Nepal. Explain how each Nepali citizen can perform their civic duties to help with successful implementation of the constitution of Nepal. Discuss how the heatlth worker can promote civic responsibility and community participation in the democratic process.	Political parties and democratic exercise in Nepal. Meaning and importance of decentralization; local level government – Village Development Committee (VDC) Municipality District Development Committee (DDC)
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion.
Course: Social Studies	
Unit: 6 Foreign Policy	Hrs. theory 12
Objectives:	Content:
Identify the determinants of Nepal's foreign policy. Explain the characteristics of Nepal's foreign policy. Explain Nepal's foreign policy with special reference to her relations with India and China. Identify Nepal's role in the peacekeeping movement of UNO. Assess the importance of regional cooperation with organizations such as SAARC.	Determinants of Nepal's foreign policy: Geographical Historical Cultural Economic International. Features of Nepal's foreign policy: Non-aligned Panchasila Acceptance of UNO charter Regional cooperation Peace movement Disarmament Others Nepal's relations with its neighbors: China India Nepal's relationship with UNO Foundation of SAARC; Nepal's role for the development of the SAARC countries.
Evaluation methods: written exams	Teaching / Learning activities and resources: classroom instruction and discussion.

24. Subjects:

c) Third year:

1. Explanatory Tantra – II
2. Quintessential Tantra – II
3. Last Tantra – II
4. Comprehensive clinical practice (in hospital setting). *(Same as P.C. Health Science, third year)*
5. Comprehensive community field *(Same as P.C. Health Science, third year)*
   A. In community setting
   B. In HP/PCH attendance.

1. Subject: Explanatory Tantra - II

Hours:	**Marks:**
Theory: 120	**Theory: 50**
Practical: 130	**Practical: 50**
Total: 250	**Total: 100**

Description:

This subject provides students the basic skills and knowledge on classification of disorders according to the Amchi medicine. It also provides basic knowledge and skills on various behaviors, dietetics and tastes as well as qualities of medicinal substances.

Objectives:

1. To classify disorders according to Amchi medical science.
2. To illustrate/demonstrate/suggest healthy routine behaviors according to Amchi medical science.
3. To illustrate/demonstrate/suggest healthy seasonal conducts in various seasons of a year.
4. To illustrate/demonstrate/suggest healthy incidental or occasional conduct according to Amchi medical science.
5. To identify/classify diets (foods and drinks) according to Amchi medical science.
6. To prescribe/suggest diet specific to specific diseases.
7. To prescribe/suggest specific dietary restrictions for specific disorders.
8. To identify/suggest balanced diet-dietary regimen dealing with right intake of food and drinks.
9. To identify/explain/show taste and potency of medicinal plants.
10. To identify/explain the function of the tastes of medicinal plants.
11. To identify/enlist/explain inherent qualities of medicinal substances.
12. To apply the skills/knowledge acquired through this subject towards the quality human health services.

Unit I: Classification of disorders: (20 hrs.)

1. Classification of diseases on the basis of
   a) Causative factors.
   b) Specific to age and sex
   c) Place of manifestation.
   d) System affected.
2. List of common disease(s) with their symptoms, remedies and numbers:
   a) Male diseases.
   b) Female diseases.
   c) Old age disease.
   d) Wind disorders common to all.
   e) Bile disorders common to all.
   f) Phlegm disorders common to all.
   g) Diseases according to their main features.
   h) Diseases according to their location.
   i) Diseases according to their types.

Unit II: The wondrous synopsis concerning conduct/behavior: (10 hrs.)

1. The routine behavior: conducts one should or should not have.
2. seasonal conduct/behavior: one should or should not have the conducts in various seasons of a year.
3. Incidental behavior/occasional conduct: suppression and retention of natural functions:
   a) One should not suppress: hunger, thirst, vomit, sneezing, yawning, breathing, sleep, expectorant phlegm, salivation, flatulence, defecation and urination.
   b) One should not retain semen.

Unit III: Dietetics: (15 hrs.)

1. Classification of life sustaining diets – starting from rice and continuing down to light (barley) soup; quality and use of particular foods and drinks.
2. Classification of cooked food, starting from ale stew of barley.
3. Dietary restrictions concerning poisoning and incompatibility.
4. The wondrous synopsis concerning balanced diet – dietary regimen dealing with right intake of food and drinks.

Unit IV: Production of medications from the five elements: (15 hrs.)

1. The earth elements produce their physical base.
2. The water elements produce their moisture.
3. The fire elements produce their heat.
4. The air elements produce their motion.
5. The space elements provide their capacity for growth.
6. The earth and water elements producing a sweet taste.
7. The fire and earth elements producing sour taste.
8. The water and fire elements producing a salty taste.
9. The water and air elements producing a bitter taste.
10. The fire and air elements producing a hot taste.
11. The earth and air elements producing an astringent test.
12. The fire and sir elements lead upwards producing emetic medications.
13. The earth and water elements move downwards producing purgative medications.

Unit V: Meteria Medica: (20 hrs.)
(Inherent qualities of medicinal substances)

Classes of medicinal substances:

1. The class of precious metals and gemstones.
2. Class for earth medications.
3. The classes of wood medications.
4. Class of herbal medications.
5. Medications derived from animal products
6. Class of bones.
7. Class of blood.
8. Class of bile.
9. Class of fat.
10. Class of brain.
11. Classification of the brain of game animals.
12. Class of hide and skin.

13. Class of animal nail.
14. Class of hair
15. Class of urine.
16. Class of dung.
17. Class of whole organism.
18. Supplementary class.

Unit VI: Classes of medications : (30 hrs.)

A. Classes of medications generally curing all common diseases of heat and cold (Pharmacology).

B. Medications for diseases of heat:

1. Class of medications which generally cure all common diseases of heat.
2. Class of medications which alleviate bile disorders.
3. Class of medications which alleviate blood diseases.
4. Class of medications which alleviate contagious diseases.
5. Class of medications which cure poisoning.
6. Class of medications for (the treatment of) the lungs.
7. Class of medications for (tranquillizing) fevers associated with wind.
8. Class of medications which alleviate phlegm (associated with heat) disorders.
9. Class of medications which alleviate disorders of phlegm associated with wind.

C. Medications for cold diseases:

1. Classes of medications which cure diseases of cold.
2. Class of medications which alleviate diseases of cold associated with phlegm disorder.
3. Class of medications which treat wind disorders.
4. Class of medications which treat disorders of serum.
5. Class of medications which treat animalcules.
6. Class of medications which stop diarrhoea.
7. Class of medications which treat urine diseases.
8. Class of emetic medications.
9. Class of purgative medications.

Unit VII: Medical instruments: (5 hrs.)

1. Identification of various types of medicinal instrument.
2. Unit: concept of finger width unit and its application.
3. Functional use of various types of medicinal instrument.
4. Classification of medicinal instrument.
5. Safe handling of medicinal instrument.
6. Storage and maintenance of medicinal instrument.
7. Safety precautions.

Unit VIII: Qualities and commitments of a physician: (5 hrs.)

1. Primary conditions of an excellent physician.
2. Commitments of a physician.
3. Similes of a physician devoid of various abilities, qualities and commitments.
4. Medicine Buddha mantra.
5. Ten positive things.
6. Gaining enlistment.

Practical Skills:(130 hrs)

Unit I: Classify disorders:

1. Classify diseases on the basis of
   a) Causative factors
   b) Specific to age and sex categories.
   c) Place of manifestation.
   d) System affected.
2. Enlist common disease(s) with their symptoms and remedies of the following categories:
   a) Male diseases.
   b) Female diseases.
   c) Geriatric (old age) diseases.
   d) Wind diseases common to all.
   e) Bile diseases common to all.
   f) Phlegm diseases common to all.
   g) Diseases according to their main features.
   h) Diseases according to their locations.
   i) Diseases according to their types.
3. Memorize various diseases with their symptoms and remedies.

Unit II: Perform healthy behaviors as recommended by Amchi medicine:

1. Perform medically recommended healthy routine behaviors.
2. Perform healthy seasonal behaviors.
3. Perform healthy incidental behaviors.
4. Enlist three types of behaviors
   a) Routine behavior: conducts one should or should not perform.
   b) Seasonal behavior: conducts one should or should not have in various seasons of a year.
   c) Incidental/occasional behavior: suppression and retention of natural functions/urges.
5. Suggest community people to follow healthy behaviors.
6. Demonstrate various behaviors/conducts.

Unit III: Develop skills on Dietics:

1. Classify life sustaining diets.
2. Classify cooked food.
3. Identify diet items with their specific qualities and uses.
4. Identify/show drinks with their specific quantities and uses.
5. Prescribe diet/drink specific for specific diseases.
6. Identify/prescribe dietary restrictions concerning poisoning and incompatibility.
7. Identify/prescribe specific dietary restrictions for specific disorders.
8. Identify/suggest/prescribe balanced diet/dietary regimen dealing with right intake of food and drinks.

Unit IV: Perform taste and quality identification of medicinal substances:

1. Illustrate/demonstrate how the medicines are produced form the five elements (i.e. earth, water, fire, air and space).
2. Show taste of medicinal plants.
3. Show potency of medicinal plants
4. Show functions of each taste of medicinal plants.
5. Show relation of tastes with cosmo-physical elements.
6. Show post-digestive tastes of medicinal plants.
7. Show the power of medicinal substances.
8. Identify medicinal substances.
9. Show eight characteristic power from medicinal substances.
10. Show seventeen characteristics from medicinal substances.
11. Enlist taste and inherent qualities of medicinal substances with their applications.

Unit V: Memorize Meteria Medica:

1. Enlist/memorize the medicinal substances under the following classes:
   a) The class of precious metals and gemstones.
   b) Class of earth medications.
   c) The class of wood medications, "nectarous" medications, plateau medications and so forth.
   d) Class of herbal medications.
   e) Medications derived from animal products: horns of animals.
   f) Class of bones.
   g) Class of blood.
   h) Class of bile.
   i) Class of fat.
   j) Class of brain.
   k) Brain of game animals: classification.
   l) Class of hide and skin.
   m) Class of animal nail.
   n) Class of hair
   o) Class of urine.
   p) Class of dung.
   q) Class of whole organisms.
   r) Supplementary classes.
2. Identify/draw illustrated diagrams of each medicinal substance under each classes with their inherent qualities including taste, power, potency and uses.

Unit VI: Identify classes of medications:

1. Identify/list/memorize classes of medications generally curing all common diseases of heat and cold.

   A. Identify/list/memorize classes of medications for diseases of heat-

      1. Identify/list/memorize classes of medications-
         a. Which generally cure all common diseases of heat?
         b. Which alleviate bile disorders.
         c. Which alleviate blood disorders
         d. Which alleviate contagious diseases?
         e. Which cure poisoning.

f. For the treatment of lungs.
g. For tranquillizing fevers associated with wind.
h. Which alleviate phlegm (associated with heat) disorders.
i. Which alleviate disorders of phlegm associated with wind.

B. Identify/list/memorize classes of medications for cold diseases:

1. Identify/list/memorize classes of medications-
   a. Which cure disease of cold.
   b. Which alleviate diseases of cold associated with phlegm disorders.
   c. Which treat wind disorders.
   d. Which treat disorders of serum.
   e. Which treat animalcules.
   f. Which stop diarrhoea.
   g. Which treat urine disorders.
2. Identify/list/memorize classes of-
   a. Emetic medications.
   b. Purgative medications.

Unit VII: Handle medicinal instrument:

1. Identify/draw/handle the following medicinal instrument with their units and functional uses:
   i. Different types of probe.
   ii. Fork.
   iii. Different types of hollow tube.
   iv. Surgical blade.
   v. Different types of forceps.
   vi. Fine tweezers.
   vii. Different types of lancet.
   viii. Scapula.
   ix. Knife.
   x. Different types of stylet.
   xi. Various types of adze.
   xii. Various types of saw.
   xiii. Surgical instrument shaped like a snake.
   xiv. Catheter instrument.
   xv. Instrument with crooked tip.
   xvi. Canula and anal canula.
   xvii. Cupping horn and fire cupping bowls.
   xviii. Inhalers.
   xix. Razors.
   xx. Gold, iron, bronze, copper and other moxibustion instrument.
   xxi. Surgical needle and medicinal spoon.
   xxii. Iron and medicinal file.
   xxiii. Eye dropper.
   xxiv. Eye and tongue pressers.
   xxv. Heat applying instrument.
   xxvi. Measuring containers.
   xxvii. Medicinal sieve.
   xxviii. Medicinal brushes.

Unit VIII: Demonstrate required qualities and commitments of a physician:

1. Enlist primary conditions of an excellent physician.
2. Enlist commitments of a physician.
3. Enlist similes of physician devoid of various abilities, qualities and commitments.
4. Demonstrate the required qualities of a physician.
5. Demonstrate the commitments of a physician.
6. Perform medication.
7. Recite medicine Buddha Mantra.
8. Perform the ten positive things.
9. Gain enlightment.

2. Subject: Quintessential Tantra - II

Hours:	**Marks:**
Theory: 120	**Theory:50**
Practical:130	**Practical:50**
Total: 250	**Total:100**

Description:

This subject provides students the basic skills and knowledge regarding the principle and practices of diagnosis and treatment of various diseases through Amchi medicine.

Objectives:

1. To perform/explain concept, principle and practices of diagnosis and treatment of the following diseases through Amchi medicine.
   - Fully developed fever.
   - Male genital diseases.
   - Female genital diseases.
   - Gynecological diseases.
   - Abdominal wounds and
   - Cases of poisoning.
2. To perform/suggest concept, principles and practices of child health care through Amchi medicine.
   - To perform child rearing.
   - To manage child diseases.
   - To manage pediatric diseases caused by evil spirits (Demons).
3. To streamline the skills and knowledge acquired through this subject towards the quality human health services.

Unit I: Extreme fever: (10 hrs.)

1. Primary causes of extreme/fully developed fever.
2. Secondary causes of extreme fever.
3. Symptoms of fully developed/extreme fever.
4. Diagnosis of extreme fever.
5. Treatment of extreme fever.
6. Principle and procedures of diagnosis and treatment of extreme fever.

Unit II: Male genital diseases: (22 hrs.)

1. Causes of male genital diseases
   a. Primary causes of the diseases of male genitalia.
   b. Secondary causes of the diseases of male genitalia.
2. Symptoms of the diseases of male genitalia.
3. Diagnosis and treatment of the diseases of male genitalia.
4. Principles and procedures for the treatment and diagnosis of the diseases of male genitalia.

Unit III: Female genital diseases: (22 hrs.)

1. Primary causes of diseases of female genitalia.
2. Secondary causes of the diseases of female genitalia.

3. Symptoms of the diseases of female genitalia.
4. Diagnosis of the diseases of female genitalia.
5. Management and treatment of the diseases of female genitalia.
6. Principles and procedures for the diagnosis and treatment of the diseases of female genitalia.

Unit IV: Child health care: (22 hrs.)

1. Principles and practices of child health care: the wondrous synopsis.
2. Child rearing: concept, principle and procedures.
3. Managing child diseases: the wondrous synopsis.
    a. Primary and secondary causes
    b. Symptoms
    c. Diagnosis and treatment
4. Managing pediatric disorders caused by evil spirits (Demons).
    a. Primary and secondary causes of demonic influence among child.
    b. Symptoms of demonic influence among child.
    c. Diagnosis, preparation of medicine and treatment of pediatric disorders caused by evil spirits (Demons).
    d. Mantra treatment for evil spirit pediatric disorders.

Unit V: Gynecological diseases: (24 hrs.)

1. Primary causes of gynecological diseases.
2. Secondary causes of gynecological diseases.
3. Symptoms of gynecological diseases.
4. Diagnosis of specific gynecological diseases.
5. Preparation of medicines for general/specific gynecological diseases.
6. Management and treatment of general/specific gynecological diseases.
7. Principles and procedures of diagnosis and treatment of general/specific gynecological diseases.
8. Explanation of the impact of the primary and secondary causes of common gynecological and obstetric diseases.

Unit VI: Abdominal wounds: (10 hrs.)

1. Wounds and their classification with causes (primary and secondary) and symptoms.
    a. Head wounds.
    b. Neck wounds.
    c. Wounds of trunk.
    d. Wounds of the limbs.
2. Causes and symptoms of abdominal wounds.
3. Diagnosis of abdominal wounds.
4. Preparation of medicine for abdominal wounds.
5. Treatment of abdominal wounds.
6. Principles and procedures for the management of abdominal wounds.

Unit VII: Poisons and poisoning: (10 hrs.)

1. Concept of compound poisons, food poisoning and naturally occurring poisons.
2. Compound poisons, with a digression in the form of a legend concerning the origin of poisons.
3. The origination of food poisoning due to dietary incompatibility and indigestion.
4. Causes of meat poisoning.

5. Causes of intoxication by naturally occurring poisons.
6. Handling of causes of poisoning.
    a. Diagnosis of the type of poison.
    b. Preparation of medicine for the case of poisoning.
    c. Treatment/management of the poisoning.

Practical skills:(130 hrs.)

Unit I: Perform treatment of fully developed fever:

1. Enlist/memorize the primary causes of fully developed/extreme fever.
2. Enlist/memorize the secondary causes of fully developed fever.
3. Enlist/identify/memorize the symptoms of fully developed fever.
4. Perform diagnosis of fully developed fever.
5. Carry out treatment of the fully developed fever.
6. Instruct patient about the treatment of the fully developed fever.
7. Provide follow-up services.

Unit II: Manage male genital diseases:

1. Enlist/memorize primary causes of the diseases of male genitalia.
2. Enlist/memorize secondary causes of the diseases of male genitalia.
3. Enlist/identify/memorize the symptoms of the diseases of male genitalia.
4. Perform diagnosis of the diseases of male genitalia.
5. Perform treatment/management of the diseases of male genitalia.
6. Instruct patient about the management of the diseases of male genitalia.
7. Provide follow-up services regarding the management of the diseases of male genitalia.

Unit III: Manage female genital diseases:

1. Enlist/memorize primary and secondary causes of diseases of female genitalia.
2. Enlist/memorize symptoms of the diseases of female genitalia.
3. Diagnose the diseases of female genitalia.
4. Carry out treatment/management of the diseases of female genitalia.
5. Instruct patient about the management of the diseases of female genitalia.
6. Follow-up the case(s).

Unit IV: perform child health care:

A. Perform child rearing:
    1. Identify correct manner of child birth.
    2. Identify incorrect manner of child birth.
    3. Assist in delivery.
    4. Cut umbilical cord.
    5. Take baby in lap.
    6. Bath baby with scented water
    7. Sweeten baby's tongue with honey.
    8. Apply oil to the head with cotton wool.
    9. Moisten the baby's palate with butter.
    10. Provide baby with mother's milk.
    11. Massage the baby's navel with a mixture of costus and butter.

B. Manage child diseases:
   1. Identify/memorize primary and secondary causes of child diseases.
   2. Identify/memorize symptoms of child diseases.
   3. Diagnose the child diseases.
   4. Manage/treat the child diseases.
   5. Provide follow-up services.

C. Manage pediatric disorders caused by evil spirits (Demons):
   1. Enlist/memorize primary and secondary causes of demonic influence among child.
   2. Enlist/identify/memorize the symptoms of demonic influence among child.
   3. Diagnose pediatric disorders caused by evil spirits (Demons).
   4. Prepare medicine for evil spirit disorders.
   5. Manage pediatric disorders caused by evil spirits (Demons).
   6. Perform Mantra treatment for evil spirit pediatric disorders.

Unit V: Manage gynecological diseases:

1. Enlist/memorize the primary and secondary causes of gynecological diseases.
2. Enlist/memorize/identify symptoms of gynecological diseases.
3. Examine/diagnose general gynecological diseases through inquiry, urinalysis and palpation.
4. Examine/diagnose specific gynecological diseases.
5. Prepare medicines for general/specific gynecological disorders.
6. Manage/treat general/specific gynecological diseases.

Unit VI: Manage abdominal wounds:

1. Identify/enlist causes and symptoms of abdominal wounds.
2. Demonstrate the abdominal wounds.
3. Diagnose the type of abdominal wound through inquiry, urinalysis and palpation.
4. Prepare medicine for the treatment of abdominal wound.
5. Perform treatment of abdominal wounds.
6. Suggest patient about the management of abdominal wounds.
7. Provide the follow-up services of the case(s).

Unit VII: Manage/handle cases of poisoning:

1. Identify poison.
2. Identify types of poison.
3. Identify type of poison taken by the patient through questioning, urinalysis and pulse feeling.
4. Prepare medicine for the treatment of poisoning.
5. Treat/manage/handle cases of poisoning.

3. Subject: Last Tantra - II

Hours:	Marks:
Theory:50	**Theory:50**
Practical:90	**Practical:50**
Total: 140	**Total: 100**

Description:

This subject equips the students with basic knowledge and skills on principles and practices of Amchi medicine regarding herbal compounds, venesection, moxibustion, needling, cupping, massage, compress, bath and spoon therapies.

Objectives:

1. To perform/explain the principle and practices of the preparation of herbal compounds for hot and cold diseases.
2. To perform/explain principle and practice of venesection.
3. To perform/explain principles and practices of moxibustion, needle therapy and cupping.
4. To perform/explain principles and practices of compress, fomentation/medicinal bath and surgical spoon therapies.
5. To apply the skills and knowledge acquired through this subject towards the quality human health services.

Unit I: Herbal compounds: (10 hrs.)

1. Identification and collection of herbs.
2. Various tastes of herbs of medicinal value.
3. Herb compounding formulae.
4. Description of herbal compounds.
5. method of preparing herbal compounds for
   a. Hot diseases
   b. Cold diseases.
6. Potency of herbal compounds and method/process of checking the potency.
7. Research in herbal compounds.

Unit II: Venesection: (13 hrs.)

1. Principles, process and application of venesection.
2. Administering blood letting.
3. Contraindications for blood letting.
4. Anterior view of blood letting vessels.
5. Posterior view of blood letting vessels.
6. Blood letting instruments: identification and safe handling.

Unit III: Moxibustion: (13hrs.)

1. Principles, process and application of moxibustion.
2. Description of the points for moxibustion.
3. Collection of Gerbera.
4. Appropriate time and place for the collection of Gerbera.
5. Correct indications for moxibustion.
6. Contra-indications for moxibustion.

7. Actual practice of moxibustion.
8. Anterior view of the moxibustion and surgical loci
    a. Moxibustion loci- types.
    b. Moxibustion and surgical loci-types
    c. Surgical loci-types.
9. Posterior view of moxibustion and surgical loci.
    a. Types of moxibustion loci.
    b. Types of moxibustion and surgical loci.
    c. Types of surgical loci.
10. Anterior and posterior views of the supplementary loci for moxibustion.

Unit IV: Massage Therapy: (10 hrs.)

1. Concept, principle, process and application of ointments (massage therapy).
2. Actual administering of ointments.
3. Correct indications for administering of ointments.
4. Contraindications for administering of ointments.

Unit V: Conclusion and entrustment of medical tantra: (4 hrs.)

1. Conclusion of four tantras.
2. Entrustment of medical tantras.
    a. The need for medical science.
    b. Treatment about diseases of life span.
    c. Result of appropriate treatment.
    d. Tantras to be kept secret: its need.
    e. Medical science and ritual murder.
    f. Giving teaching to the worthy recipients to whom these tantras should be entrusted.

Practical skills: (90 hrs.)

Unit I: Prepare herbal compounds:

1. Identify/collect herbs of medicinal value available in the locality.
2. Identify taste of herbs.
3. List herb-compounding formulae.
4. Prepare herbal compounds for hot diseases.
5. Prepare herbal compounds for cold diseases.
6. Check potency of herbal compounds.
7. Assist in research on herbal compounds.

Unit II: Perform venesection:

1. Identify all points of venesection (of human body).
2. Illustrate/draw all points of body for venesection.
3. Identify/draw/illustrate the dangerous points of human body.
4. Identify points of venesection for hot and cold disorders.
5. Perform venesection.
6. Demonstrate venesection.
7. Follow-up the patients who received venesection.

Unit III: Perform Moxibustion, Needling and cupping:

A. Perform Moxibustion:
   1. Identify all points for moxibustion.
   2. Draw/illustrate all points of moxibustion.
   3. Identify diseases to be treated by moxibustion.
   4. Collect/prepare tools/materials for moxibustion.
   5. Identify diseases that should not be treated by moxibustion.
   6. Perform moxibustion.
   7. Follow precautions.

B. Perform needle therapy:
   1. Identify points for needle therapy.
   2. Prepare instrument/tool for needle therapy.
   3. Perform needle therapy safely.
   4. Identify diseases cured by needle therapy.
   5. Follow precautions.

C. Perform cupping:
   1. Identify the site for cupping.
   2. Prepare the instrument/tool for cupping.
   3. Perform cupping safely.
   4. Follow precautions.

Unit IV: Perform massage therapy:

1. Identify/enlist positive effects of massage therapy.
2. Identify/enlist diseases for which massage therapy can be used.
3. Prepare various massage oils.
4. Perform massage.
5. Follow precautions.

Unit V: Perform compress, bath and spoon therapies:

1. Identify cases to be handled by compress, bath and spoon therapies.
2. Prepare for the therapies.
3. Perform the therapies:
   a. Perform compress therapy safely.
   b. Perform fomentation/medicinal bath therapy following all necessary precautions.
   c. Perform minor surgery/surgical spoon therapy following all necessary precautions.
4. Follow-up the cases handled.

4. Subject: Comprehensive Clinical Practice (In Hospital setting)

Upon completion of the program the student will be able to:

Clinical Objectives for Surgery - I & Medicine - I

A. History & Physical
1. Take history:
    a. establish trust with the patient/family
    b. elicit complete data re: chief complaint, social/personal/demographic data, immunization/diseases history.
2. Perform physical examination:
    a. vital signs per guidelines
    b. assess JALCCO symptoms
    c. assess hydration status in all ages
    d. evaluate mental status/cognition/mood
    e. recognize normal/abnormal growth & development
    f. identify normal/abnormal conditions of the body systems through inspection, auscultation, percussion and palpation of heart and lungs, abdomen, nervous system, integumentary system, renal system, gastrointestinal system, circulatory system, lymphatic system, musculo-skeletal system
3. Use abstract reasoning to correlate the abnormal findings with provisional/differential diagnoses.
4. Identify the appropriate laboratory tests for confirming diagnoses.
5. Select appropriate response for conditions: treatment of simple conditions/ referral of complex cases.

B. Asepsis/Sterile Technique
1. Identify which activities require sterile or aseptic techniques.
2. Apply principles of asepsis/sterile technique when performing procedures that require this.
3. Sterilize instruments and other materials according to protocol.
4. Implement measures for control of contagious disease.

C. Wound Care
1. Clean, debride, drain wounds per protocol
2. Suture wounds and remove stitches
3. Apply various types of aseptic/sterile dressings, compresses, bandages

D. Invasive Procedures
1. Pass a feeding tube and administer tube feedings
2. Give various types of enemas
3. Safely administer medications via IM, IV, intradermal, subcutaneous routes
4. Draw blood for specimens
5. Start IV infusions

E. Emergency and First Aid
1. Identify and respond to interferences with patient=s airway, breathing, circulation
2. Identify and treat impending shock according to protocol
3. Identify and respond to epileptic seizure according to protocol

4. Control hemorrhage
5. Administer blood transfusion according to protocol
6. Immobilize the patient with potential fracture
7. Identify and respond to injestion of toxic substances
8. Identify protocol for treatment of injury/bites of snakes, mammals, insects
9. Apply the principles of triage care to a multiple-victim situation
10. Stabilize and transport complex cases to a higher care center

Clinical Objectives for Medicine - II

Psychiatry

1. Identify the clinical features of psychosis, depression, bipolar mood disorders, anxiety disorders.
2. Assess the mental and psychological status of clients.
3. Assess the risks for suicide by a client.
4. Maintain a safe, comforting environment for the suicidal client and counsel the family to do the same.
5. Treat the client who has attempted suicide by overdose.
6. Differentiate between actual physiological disease and somatoform (hysterical) symptoms.
7. Medicate the client who presents with severe symptoms of psychosis, depression or anxiety.
8. Identify indications for referral to a specialty center for treatment.

Dermatology

1. Identify common skin lesions and conditions
2. Differentiate between the common skin conditions
3. Advise for the treatment and prevention of skin disorders
4. Identify and refer complex conditions
5. Implement measures to prevent transmission of contagious conditions

Pediatrics

1. Assess the infant/child regarding: growth and development, congenital abnormalities, injuries.
2. Conduct complete history taking including birth history from guardian.
3. Perform a complete physical examination according to Integrated Management of Childhood Diseases (IMCD).
4. Implement treatment according to guidelines (IMCD).
5. Identify and refer cases requiring higher level care.
6. Administer immunizations according to guidelines.
7. Counsel mothers regarding: nutrition, safe drinking water, hygiene, hypo/hyperthermia, how to use oral rehydration, symptoms requiring medical attention, family planning.
8. Distribute vitamin supplements as needed.

Clinical Objectives for Surgery - II

Ophthalmology

1. Perform a basic eye examination; visual acuity, gross appearance of upper & lower conjunctiva and cornea.
2. Identify and advise for treatment simple eye disorders of the eyelids including blepharitis, stye, chalazion, trichiasis, entropion, ectropion.

3. Identify various causes of conjunctivia, advise treatment, and take measures to prevent spread of contagious conjunctivitis.
4. Identify and advise treatment for trachoma; take actions to prevent trachoma.
5. Identify corneal ulcer, institute appropriate therapy, and refer for expert care.
6. Identify ocular manifestations of vitamin A deficiency, advise treatment and take measures to prevent this disease.
7. Identify symptoms or presence of cataract, iridocyclitis, glaucoma, refractive errors, and refer these cases for expert care.
8. Perform removal of foreign bodies from conjunctiva and cornea in simple cases.

Otorhinolaryngology (ENT)

1. Elicit history of ear, nose, and throat conditions
2. Demonstrate basic methods of examination of the ear, nose & throat
3. Identify and treat common simple conditions of the ear, nose & throat
4. Assess for gross hearing impairment and refer as indicated
5. Intervene with foreign bodies or hemorrhage of ear, nose & throat

Dentistry

1. Demonstrate the techniques and counsel the purpose of oral health care
2. Perform loose teeth extractions
3. Identify and treat simple conditions of the mouth, teeth, and jaw
4. Identify complex cases for referral to higher level care
5. Manage simple post-extraction hemorrhage or tooth pain
6. Perform local anaesthetic procedures

Clinical Medicine Objectives for Obstetrics & Gynecology

A. Labor & Delivery:

1. Confirm labor and perform a complete antenatal assessment.
2. Identify the stages of normal L&D for primipara and multipara women.
3. Assessment the progress of labor: cervical changes, effacement, dilation, mucus show, amniotic release, crowning, duration & frequency of contraction, desire to push.
4. Implement measures to promote comfort and the progression of labor.
5. Observe the assessment of the presentation, rotation & descent of the fetal occiput, both vaginally and externally.
6. Assist with the procedures for the management of second stage labor.
7. Assist with the procedures for the active management of third stage labor.
8. Assess for the signs & symptoms of prolonged labor/fetal distress/maternal distress.
9. Assist with the process for assessment and treatment of retained placenta, cervical or vaginal tears, uterine atony.
10. Differentiate the causes of post partum hemorrhage and observe/assist with the treatment for each.
11. Conduct normal deliveries and assist with abnormal deliveries.
12. Demonstrate the procedure for removal of retained placenta.
13. Demonstrate the procedure for suturing of a simple episiotomy

B. Newborn Care/Postpartum Care

1. Assist with newborn care
2. Assess the postpartum patient for complications
3. Examine the newborn according to the assessment guidelines.
4. Evaluate the ability of the infant to breastfeed successfully.

5. Counsel the new mother/family regarding: breastfeeding, hygiene, nutrition, immunizations, family planning.
6. Teach newborn danger signs and postpartum danger signs to the new mother.
7. Assess the symptoms and assist with management of postpartum complications.

C. Complications of Pregnancy

1. Assist with management of various types of abortion.
3. Assist with the management of the various causes of vaginal bleeding.
4. Assess for the symptoms of pre-eclampsia and eclampsia.
5. Assist with the treatment for eclampsia.

D. Gynecology

1. Identify the clinical features of common gynecological conditions that require hospital treatment.
2. Administer the prescribed treatment for gynecological conditions requiring hospitalization.
3. Evaluate the effectiveness of prescribed treatments.
4. Counsel clients regarding prevention of gynecological disorders.

Clinical Objectives for OB-GYN Out Patient Services

Antenatal/Postpartum Care OPD

1. Identify signs and symptoms of normal pregnancy.
2. Assess for symptoms of complications of pregnancy that will require hospital management.
3. Identify risk factors that require treatment or special monitoring and prescribe that treatment..
4. Counsel pregnant women regarding: preparation for delivery, nutrition, healthy behaviors, warning signs to report, immunization schedule, breastfeeding, family planning.
5. Document the progress of pregnancy according to agency procedure.
6. Assess the post partum client for complications of delivery.

Immunizations/Well Baby OPD

1. Assess the infant regarding: growth and development, congenital abnormalities, injuries.
2. Identify and refer cases requiring higher level care.
3. Administer immunizations according to guidelines.
4. Counsel mothers regarding: nutrition, safe drinking water, hygiene, hypo/hyperthermia, how to use oral rehydration, symptoms requiring medical attention, family planning.
5. Distribute vitamin supplements as needed.

Gynecology OPD

1. Identify and treat simple conditions of the female reproductive tract: vaginal discharge, prolapsed uterus, pelvic inflammatory disease, sexually transmitted diseases
2. Give contraceptive teaching and refer for sterilization as needed
3. Identify and refer conditions requiring surgical treatment: intra-abdominal mass, fibroid, tumors, Bartholin abscess
4. Identify and respond to abnormal vaginal bleeding, pre & post menopause

Family Planning OPD

1. Identify the benefits of family planning to clients.
2. Assess the client who seeks family planning assistance: to rule out pregnancy, to determine ability to use certain methods, to determine family/individual desires.
3. Describe the advantages and disadvantages of the available methods of contraception in terms which are understandable to clients.

4. Assist the client to freely select an appropriate method of contraception.
5. In simple terms, explain how to correctly use each method of birth control.
6. Identify strategies for dealing with undesired effects of each method.
7. Identify medical conditions that indicate use of a contraceptive method to prevent pregnancy.

5. Comprehensive Community Field Practice (HP, PHC, & community settings)

On completion of this course the student will be able to:

Primary Health Care Services

1. Provide competent middle-level health care: diagnosis and treatment for uncomplicated mental & physical, acute & chronic health care problems.
2. Perform a complete history taking and physical exam on children and adults, to identify abnormal conditions.
3. Make home visits to fully assess the health care needs of the family situation.
4. Direct community outreach services.
5. Identify and respond to the needs of vulnerable populations (children, the poor, persons without family, mentally disturbed, retarded, homeless, aged & infirm).
6. Intervene with the trafficking of vulnerable persons.
7. Identify the constraints, limitations and potentials of the health post situation when giving primary health care.
8. Use problem solving and adaptation to meet the health care needs of individuals or families.
9. Identify indications for referral to a higher level health care facility.

Community Diagnosis

1. Develop a project timetable which sets the schedule for a community diagnosis project.
2. Develop and pretest a community survey questionnaire for the Community Diagnosis project.
3. Establish good rapport with the community members of the target population.
4. Create a geographic map of the selected community.
5. Collect data using a representative sample and appropriate techniques (questionnaire, interview, observation, others).
6. Process the data and perform an interpretation and needs assessment.
7. Present the community with an analysis of the problem.
8. Design and implement solutions in partnership with the community (Micro Project).
9. Evaluate the effectiveness of the solutions.
10. Develop a written report and give an oral presentation on the project.

Environmental Health

1. Promote public responsibility for environmental sanitation through health education.
2. Identify and resolve contamination of drinking water within the community.
3. Promote the construction of pit latrines.
4. Counsel individuals and community to promote personal hygiene habits.
5. Identify and advise individuals and community about hygienic methods for maintaining domestic animals.
6. Identify occurrences of threats to the eco-system of the community and promote public support for sound environmental management.
7. Apply environmental sanitation principles in controlling communicable disease.

Health Education

1. Identify and prioritize community health needs based on data collection.
2. Plan and implement health education programs that promote wellness, prevent illness, and teach curative and rehabilitative health care.
3. Use health education methods and media appropriately, creatively and effectively.
4. Monitor the implementation of health education programs.
5. Evaluate the effectiveness of health education programs and modify them as needed.

Family Health

1. Implement motivational strategies for selection of suitable family planning methods by individuals and couples.
2. Provide family planning materials, education and follow-up care.
3. Implement national guidelines for the care of mothers and children.
4. Provide for antenatal, perinatal, postnatal care to mothers and infants.
5. Promote and provide the recommended immunizations for children and mothers.
6. Promote healthy nutrition among all family members.
7. Identify treat and resolve the problem of childhood malnutrition among community children.
8. Identify treat and prevent the common diseases of young children.

School Health

1. Identify and analyze the occurrence of health problems among school age children.
2. Identify and analyze environmental health problems of the schools.
3. Present a data based needs analysis of school health problems to school authorities.
4. Implement solutions to school health problems.
5. Provide health instruction to students including nutrition, sex education and prevention of communicable disease.
6. Provide regular health checkups to school children.

Health Post Management

1. Describe the functions of the national public health care agencies, public health NGO's and INGO's and tell how the health post cooperates with each.
2. Analyze and describe community dynamics as they relate to community health.
3. Promote community partnership in health post activities.
4. Take appropriate measures to prevent/control communicable disease.
5. Maintain accurate records of health post activities.
6. Submit reports accurately and promptly.
7. Supervise and direct the health post staff.
8. Maintain communications with all coordinating agencies,
9. Maintain health post supplies, inventories and logistics.
10. Promote quality assurance principles in health post activities.
11. Maintain a safe and pleasant health post environment.