

CURRICULUM
for
DIPLOMA
in
Geomatics Engineering
(Three Years Program- Semester System)



Council for Technical Education and Vocational Training
Curriculum Development Division

Sanothimi, Bhaktapur

Course Developed in 2000 as Diploma in Survey Engineering
Revised in 2010

Diploma in Geomatics Engineering, 2010

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Background

The course was initiated as Diploma in Survey Engineering in 2000. With regard to various developments in this sector and also the field of application, the need of revision of this course has become prominent. Most of the international institutions and universities currently recognize this subject of study as GEOMATICS. Also, in view of the Kathmandu University initiative in this subject by starting the Bachelor's of Engineering in Geomatics Engineering in Nepal has prompted for change in the course title as **Diploma in Geomatics Engineering**. The course is aimed at producing middle level technical human resource in the field of Geomatics.

1. Introduction:

This curriculum is of three years duration with six semesters. It is designed to produce middle level competent Geomatics technicians equipped with knowledge and skills related to the land surveying, engineering/ construction surveying and Geographical Information System and applications.

The study of Geomatics Engineering provides the ample opportunities of employment and self employment in the field of surveying, mapping and GIS.

2. Course title:

Diploma in Geomatics Engineering

3. Course Objectives:

- This course is designed to produce Surveyors / Geomatics Technicians meeting the requirement of intermediate level of surveyors for the Government and engineering construction industry / companies
- The graduates shall have adequate knowledge and skill in spatial data acquisition using field survey methods, processing and visual presentation
- The graduates will have working knowledge in interpreting image data acquired through Air survey and Remote Sensing
- The graduates shall be capable for continuing higher education.

4. Duration:

3 Academic Years (Six Semesters)- 15 weeks/semester, 40 hrs/ week.

5. Target Group:

SLC passed or equivalent

6. Group size:

A maximum of 48 (Forty eight) in a batch

7. Target location:

The main targeted group will be from all over Nepal. Foreign student are eligible to get admitted in the course with due permission of CTEVT.

8. Entry criteria:

- SLC or equivalent with English, Science, and Mathematics or Technical SLC (TSLC) course in related subjects.
- Should pass entrance examination.
- Candidate should be physically fit for the program.

9. Selection:

Applicants fulfilling the entry criteria will be selected for admission in order of merit in entrance examination result.

10. Medium of instruction:

The medium of instruction will be in English/ Nepali or both

11. Pattern of attendance:

Minimum of 90% attendance in each subject is required to appear in the respective final examination

12. Teacher and student ratio:

- For theory: As per the nature of the course.
- For practical / demonstration: 1:12.
- For bench work: 1:6.
- 75 % of the technical teachers must be full timer.

13. Teachers and Instructors:

- The teacher must possess a minimum of Bachelor's Degree in the related field or Equivalent with three years experience in the related field.
- The Instructor must hold a minimum of Intermediate degree or equivalent in the related area with three years of experience in the relevant field.

14. Mode of Education:

There will be inductive and deductive mode of education.

15. Instruction methods:

- Lecture will be the method of instruction supported by tutorials and practical works.
- The topic and concepts presented in the lecture will be enlarged and developed in tutorials.
- Practical classes will be used in the form of in-door and out-door field exercises and laboratory works. Group works and project work tools will be used for practical application of the knowledge and skills gained.

16. Examination and marking scheme:

- The subject teacher will internally assess the students' achievement in each subject during the course at least two times followed by a final examination at the end of each semester.
- Theoretical subjects will be evaluated at 20% for the internal assessment and 80% for the semester final examination.
- Practical subjects will be evaluated at 60% for the internal assessment and 40% for the semester final examination
- All theory components in the final semester examination will be evaluated through written tests.
- Generally the method of continuous assessment will be adopted for practical components.
- Examination for the practical components of the course will be made through lab works, documentation of practical exercises, performance skill tests and viva.
- Student who fails in the internal assessment of any of the subjects will not be qualified to sit in the semester final examination in the particular subject.
- Any student not being able to attend the semester final exam will not be allowed to continue in the successive semester.

17. Provision of back paper:

There will be the provision of back paper examination but student must pass all the subjects of all six semesters within six years from the enrolment to qualify for the Diploma.

18. Certification and degree awards:

- Students who have passed all the components of all the subjects of all semesters are considered to have successfully completed the course.
- Students who have successfully completed the course will be awarded a **Diploma in Geomatics Engineering.**

19. Disciplinary and ethical requirements:

- Intoxication, insubordination or rudeness to peers will result in immediate suspension followed by review by the disciplinary review committee of the Polytechnic division CTEVT/ Institution
- Dishonesty in academic activities will result in immediate suspension followed by administrative review, with possible expulsion.
- Illicit drug use, bearing arms in the institution, threats or assaults to peers, faculty or staff will result in immediate suspension, followed by administrative review with possible expulsion.

20. 21. Pass marks:

The students must secure 40% marks in the internal assessment and 40% in the semester final examination of each subject to pass the subject.

21. Grading system:

The overall achievement of each student will be measured by a final aggregate percentage of all final semester examinations and graded as follow: -

Marks division:

- Distinction : > or =80 %
- First division : 65 % to < 80 %
- Second division : 50 % to 65 %
- Pass : 40 % to < 50 %

22. Curriculum and credits:

In this curriculum each subject has its code; full marks; and credit hours divided into lecture hours, tutorial hours, and practical hours.

23. Course Description

This course is based on the job required to perform by a Geomatics technician at different related industries and organizations in Nepal and abroad. The Diploma in Geomatics Engineering program extends over three years. Each year is divided into two semesters. There are six semesters in total within the period of three years. This curriculum includes the basic science subjects like physics, chemistry, and mathematics applicable in the field of Geomatics Engineering. It also includes language subjects like Nepali and English applicable for the communication in the field of Geomatics technology. The course structure and the subject-wise contents that follow reflect the details of this curriculum. In short, this curriculum guides its implementers to produce competent and highly employable middle level technical human resources in the field of Geomatics Engineering

The contents of individual subjects prescribed in the curriculum are incorporated in the light of "must to know and must to do" principle.

24. Subjects Codes

Each subject is coded with a unique number preceded and followed by certain letters as mentioned in following chart:

25. Career Option:

- The graduates will be eligible for the position of Non-gazetted class I in Nepal Government services as Surveyor or as prescribed by the Public Service Commission of Nepal.
- The graduates well acquainted with land data acquisition, process and visual presentation with fundamental knowledge of GIS and remote sensing are highly in demand in the engineering profession.

- The DiGE graduates can well serve as Geomatics Technicians in the field of Local level planning, Land resource management, Natural Resource planning, and development construction
- The graduates are eligible for their academic pursuance in Bachelor's level of education.

Diploma in Geomatics Engineering
Curriculum Structure

Year: I

Part: I

Teaching Schedule			Mode				DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Total Hours	Theory			Practical				
							Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG1101SH	Communicative Nepali	2			2	10	40	1.5				50	
2	EG1102SH	Communicative English I	2			2	10	40	1.5				50	
3	EG1103SH	Engineering Mathematics I	3	1		4	20	80	3				100	
4	EG1104SH	Engineering Physics I	3	1	2	6	20	60	3	10	10	2	100	
5	EG1105SH	Engineering Chemistry I	3	1	2	6	20	60	3	10	10	2	100	
6	EG1106GE	Survey Drawing I			8	8				90	60	4	150	
7	EG1107GE	Survey Instruments I		2	10	12				120	80	4	200	
Total			13	5	22	40	80	280		230	160		750	

Year: I

Part: II

Teaching Schedule			Mode				DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Total Hours	Theory			Practical				
							Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG1201SH	Communicative English II	2			2	10	40	1.5				50	
2	EG1202SH	Social Studies	2			2	10	40	1.5				50	
3	EG1203SH	Engineering Mathematics II	3	1		4	20	80	3				100	
4	EG1204SH	Engineering Physics II	3	1	2	6	20	60	3	10	10	2	100	
5	EG1205SH	Engineering Chemistry II	3	1	2	6	20	60	3	10	10	2	100	
6	EG1206GE	Computer Application	2	1	5	8	10	40	1.5	60	40	3	150	
7	EG1207GE	Survey Instruments II		2	10	12				120	80	4	200	
Total			15	6	19	40	90	320		200	140		750	

Diploma in Geomatics Engineering
Curriculum Structure

Year: II

Part: I

Teaching Schedule			Mode				DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Total Hours	Theory			Practical				
							Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG2101SH	Applied Mathematics & Statistics	3	1		4	20	80	3				100	
2	EG2102GE	Fundamental of Surveying	3	1	6	10	20	80	3	60	40	3	200	
3	EG2103GE	Control Surveying I	3	1	8	12	20	80	3	60	40	3	200	
4	EG2104GE	Cartography I	3	1	4	8	20	80	3	30	20	2	150	
5	EG2105GE	Survey Drawing II			6	6	-	-	1.5	60	40	4	100	
Total			11	4	25	40	90	360		180	120		750	

Year: II

Part: II

Teaching Schedule			Mode				DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Total Hours	Theory			Practical				
							Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG2201GE	Control Surveying II	2	1	6	9	10	40	1.5	60	40	3	150	
2	EG2202GE	Topographical Survey	3	1	6	10	20	80	3	60	40	3	200	
3	EG2203GE	GIS Basics	3	1	4	8	20	80	3	60	40	3	200	
4	EG2204ES	Earth Science & Environment	2	1	3	6	10	40	1.5	30	20	2	100	
5	EG2205GE	Survey Computation and Adjustment	2	1	4	7	10	40	1.5	30	20	2	100	
Total			12	5	23	40	70	280		240	160		750	

Diploma in Geomatics Engineering Curriculum Structure

Year: III

Part: I

Teaching Schedule			Mode				DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Total Hours	Theory			Practical				
							Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG3101GE	Cadastral Surveying	3	1	10	14	20	80	3	90	60	4	250	
2	EG3102GE	Photogrammetry	4	1	3	8	20	80	3	30	20	2	150	
3	EG3103GE	Remote Sensing	2	1	2	5	10	40	1.5	30	20	2	100	
4	EG3104SH	Entrepreneurship & Community Skill	2	1	3	6	10	40	1.5	30	20	2	100	
5	EG3105GE	Elementary Geodesy, Astronomy And GPS	3	1	3	7	20	80	3	30	20	2	150	
Total			13	5	22	40	80	320		210	140		750	

Year: III

Part: II

Teaching Schedule			Mode				DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Total Hours	Theory			Practical				
							Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG3201GE	Survey Management	2	1		3	10	40	1.5				50	
2	EG3202GE	Land Administration and Laws	2	1		3	10	40	1.5				50	
3	EG3211CE	Civil Construction	2	1	2	5	10	40	1.5	30	20	2	100	
4	EG3212CE	Quantity Surveying	2	1	2	5	10	40	1.5	30	20	2	100	
5	EG3205GE	GIS Applications	2	1	6	9	10	40	1.5	60	40	3	150	
6	EG3206GE	Engineering Survey	2	1	4	7	10	40	1.5	30	20	2	100	
7	EG3207GE	Project Work			8	8				120	80	4	200	
Total			12	6	22	40	60	240		270	180		750	

First Year

(Semester I & II)

Semester I

EG1101SH	Communication Nepali
EG1102SH	Communication English I
EG1103SH	Engineering Mathematics I
EG1104SH	Engineering Physics I
EG1105SH	Engineering Chemistry I
EG1106GE	Survey Drawing I
EG1107GE	Survey Instruments I

कम्युनिकेसन नेपाली
ई.जी. ११०१ एस.एच.

वर्ष : प्रथम

जम्मा: २ घण्टा/ हप्ता

सेमेष्टर : प्रथम

प्रवचन: २ घण्टा/ हप्ता

पूर्णांक : ५०

कोर्सको परिचय

यस विषयमा विद्यार्थीहरूले भावी व्यवसायमा प्रभावकारी ढङ्गले सञ्चार गर्नका लागि आवश्यक पर्ने ज्ञान र सीपसँग सम्बन्धित नेपाली सञ्चारात्मक भाषा, लेखन सीप, र कृति परिचयको ढाँचा गरी जम्मा ३ वटा एकाईहरू सभावेश गरिएका छन् ।

कोर्सको उद्देश्य :

यस पाठ्यांशको अध्ययनबाट विद्यार्थीहरूले निम्नलिखित भाषिक क्षमता विकास गर्न सक्नेछन्:-

- १ आफ्नो व्यावसायिक कार्य क्षेत्रमा प्रभावकारी सञ्चार गर्न
- २ आफ्नो व्यवसायसँग सम्बन्धित विविध लेखन सीप प्रदर्शन गर्न
- ३ कार्य सम्पादनमा आवश्यक परिस्थितिजन्य संवाद गर्न ।

पाठ्यांशको विषयवस्तु

एकाइ १: सञ्चारात्मक नेपाली भाषा

(७)

१.१ भाषिक भेदको परिचय

- मौखिक र लिखित
- औपचारिक र अनौपचारिक
- अमानक र मानक
- सामान्य र प्रयोजनपरक (विशिष्ट) भेदको सोदाहरण परिचय

१.२ दैनिक कार्यमा प्रयोग हुने भाषाको ज्ञान र प्रयोग

- अनुरोध तथा आदेश/निर्देशन गर्ने भाषाको ज्ञान र प्रयोग
- सोझै गरिने कामहरूमा प्रयोग हुने भाषाको ज्ञान र प्रयोग
- प्रश्नात्मक र वर्णनात्मक भाषाको ज्ञान र प्रयोग

एकाइ २: लेखन सीप

(१८)

२.१ बोध, शब्दनिर्माण र शब्दभण्डारको ज्ञान र अभ्यास

- क) शब्द भण्डार निर्माण र अभ्यास
- उपसर्ग
 - प्रत्यय, (कृत् तथा तद्धित)
 - समास
 - प्राविधिक तथा पारिभाषिक शब्दहरूको ज्ञान र प्रयोग
- ख) प्राविधिक/पारिभाषिक शब्दहरूको शब्दस्रोत,
- वर्णविन्यास (प्राविधिक शब्दका सन्दर्भमा आवश्यक मात्र)
 - अर्थ र व्युत्पत्तिका लागि शब्दकोशको प्रयोगको अभ्यास
- २.२ बुँदाटिपोट, सङ्क्षेपीकरण
- बुँदा लेखन
 - सारांश लेखन
- २.३ अनुच्छेद लेखन / प्रतिवेदन लेखन
- २.४ निबन्ध लेखन
- २.५ पत्र लेखन (निमन्त्रणा पत्र, सूचना, सम्पादकलाई चिठी र निवेदन आदि)
- २.६ संवाद लेखन

एकाइ ३: कृति परिचय : निम्न लिखित ढाँचामा तलका कृतिको परिचय लेख्ने अभ्यास (५)

३.१ कृति परिचयको ढाँचा :

- कृतिको नाम :
- कृतिकारको नाम :
- कृतिका मूल विषयवस्तु : (एक अनुच्छेद)
- कृतिको महत्व : (एक अनुच्छेद)
- कृतिले आफूलाई पारेको प्रभाव : (छोटो एक अनुच्छेद)
- कृतिको भाषा शैली : (छोटो एक अनुच्छेद)
- कृतिको कमी, कमजोरी र सुभाव : (छोटो एक अनुच्छेद)
- निष्कर्ष

३.२ कृतिहरू :

- सौर्य उर्जा
- ट्रेड कोर्स (कालिगढ तालिम) : एक परिचय : इ.अ.सं. पश्चिमाञ्चल क्याम्पस पोखरा ।
- भूकम्पबाट सुरक्षित रहन गर्नु पूर्व तयारी: भूकम्प प्रविधि राष्ट्रिय समाज नेपाल ।
- इन्जिनियरिङ नेपाली: लालानाथ सुवेदी ।
- सिंचाई प्रविधि ज्ञान : भोजराज रेग्मी, त्रि. वि. पाठ्यक्रम विकास केन्द्र

सिकाई सामग्रीहरू

- त्रि. वि. पाठ्यक्रम विकास केन्द्र, अनिवार्य नेपाली शिक्षण निर्देशन, काठमाण्डौ
- लालानाथ सुवेदी, इन्जिनियरिङ नेपाली विद्यार्थी पुस्तक भण्डार, भोटाहिटी, काठमाण्डौ ।
- लालानाथ सुवेदी, नेपाली व्याकरण, बोध/रचना (सम्बन्धित अंश मात्र) विद्यार्थी पुस्तक भण्डार, भोटाहिटी, काठमाण्डौ ।
- गोरखापत्र, कान्तिपुर आदि पत्रिका सम्पादकीय, टिप्पणी र लेखहरू ।
- प्रशिक्षकहरूले आफ्नो पुस्तक तयार गर्न वा बजारमा पाइने सामग्री छानेर पढाउन सक्ने, तर परीक्षा महाशाखालाई यसको पूर्व जानकारी दिनुपर्ने

Communication English

EG 1102 SH

Year: I	Total: 2 hour/week
Semester: I	Lecture: 2 hours/week
	Tutorial: hours/week
	Practical: hours/week
	Lab: hours/week

Course Description:

This subject consists of four units related to communicative English; writing skills in English; English sounds and structures; and English conversation practices so as to equip the students with the skills and knowledge of communication in English language in order to have an effective and efficient job performance through occupational communication in the workplace.

Course Objectives:

After the completion of this subject, students will be able to:

1. Familiarize with English sound and basic structures.
2. Communicate in English language at work/job environment
3. Define and use trade related technical terminologies
4. Demonstrate situational/structural conversation essential for job performance
5. Demonstrate various writing skills

Course Contents:

Unit 1.	English sound and basic structures:	[2]
1.1.	Define with examples: <ul style="list-style-type: none">• Phonemes• Morphemes	
1.2.	Introduction to English sounds with examples: <ul style="list-style-type: none">• The Vowels• The Consonants	[2]
1.3.	Dictionary skills <ul style="list-style-type: none">• Alphabetical order• Dictionary entry• Guide words, head words	[3]
1.4.	Spellings <ul style="list-style-type: none">• British and American English spelling	[1]
Unit 2.	Introduction to grammatical units with examples:	
2.1	Grammatical units <ul style="list-style-type: none">• The word	[2]

	<ul style="list-style-type: none"> • The phrase • The clause • The sentence 	
2.2	Types of sentence	[2]
	<ul style="list-style-type: none"> • Forms • Function 	
2.3	Communicative functions	[4]
	<ul style="list-style-type: none"> • Introducing • Requests and offers • Expressing gratuities • Expressing likes/dislikes • Asking for permission • Agreeing/disagreeing • Encouraging/discouraging • Inviting/making invites • Accepting/declining • Suggesting/advising • Making and receiving telephone calls • Group discussing and presentation 	
Unit 3.	Reading:	[2]
	<ul style="list-style-type: none"> • Reading comprehension • Defining trade related terminologies 	
Unit 4.	Writing skills in English:	[12]
4.1.	Writing paragraphs	
4.2.	Writing dialogues	
4.3.	Writing precies/summaries	
4.4.	Writing letters	
	<ul style="list-style-type: none"> • Job application with resumes • Leave application • Business letters • Orders • Complains 	
4.5.	Writing essays	
4.6.	Writing technical reports	
4.7.	Writing meeting minutes	
4.8.	Writing notices	
4.9.	Writing notices	
4.10.	Writing instructions	
4.11.	Writing technical proposal	

Learning materials:

1. Poudel, R.C., A Manual to Communicative English, K.P. Pustak Bhandar, Kathmandu, 1956/57.
2. Shah, B.L., A text book of writing skills in English, First edition Hira Books Enterprises, Kathmandu,
3. Fruehling, R. T. and Oldham N. B., Write to the point, McGraw- Hill, Inc. New York NY 10020
4. Taylor, G., English conversation practice, 1975.
5. Maharjan L. B., A textbook of English sounds and Structures, Vidyarthi Pustak Bhandar, Kathmandu, 2000.
6. Todd, L.A.N introduction to Linguistics, Longman York press, 1991.
7. Blundell, Jon, Higgins, Jonathan & Middlemiss, Nigel, Function of English, Oxford University Press
8. Naterop, Jean, Reuell, Rod, Telephoning in English, Cambridge University Press,
9., Better English Pronunciation, Cambridge University Press, New edition
10. Link English, Central Department of English, Tribhuvan University
11. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject.
12. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Mathematics I

EG 1103 SH

	Total: 5 hour /week
Year: I	Lecture: 4 hours/week
Semester: I	Tutorial: 1 hours/week
	Practical: hours/week
	Lab: hours/week

Course Description:

This subject consists of four units related to trigonometry; coordinate geometry; algebra; and calculus necessary to develop mathematical background helpful for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area

1. Trigonometric ratios and equations, inverse circular functions and properties of triangles
2. Straight lines, angle between lines, circle and parabola
3. The progressions, permutations and combinations, binomial theorem, exponential and logarithmic series as well as the quadratic and polygonal equations
4. Sets, limit and continuity, derivatives, integration and integrals.

Course Contents:

Unit 1.	Trigonometry:	[12]
1.1.	Review of trigonometric ratios: <ul style="list-style-type: none">• Basic trigonometric formulae• Identities and conditional identities.	
1.2.	Trigonometric equations: <ul style="list-style-type: none">• Periodicity of trigonometric functions• General solutions of the following equations:<ul style="list-style-type: none">- $\sin x = k$, $\cos x = k$ and $\tan x = k$ and using trigonometric equations.	
1.3.	Inverse circular functions: <ul style="list-style-type: none">• Domain and their graphs• Formulae involving inverse circular functions• Simple identities and equations involving circular functions	
1.4.	Properties of triangles: <ul style="list-style-type: none">• The sin law	

- The cosine law
- The projection law
- The half angle formulae
- The area of a triangle
- The encircles and ex-circles of a triangle

Coordinate Geometry: [12]

2.1 Straight lines:

- The three standard forms of equations of a line.
- The linear equation: $ax + by + c = 0$.
- Any line through the intersection of two lines.
- Concurrency of lines.

2.2 Pair of straight lines:

- Angle between two lines
- Bisectors of angles between two lines
- Pair of lines
- Homogeneous equation of second degree
- General equation of second degree representing two lines
- Angle between a pair of lines
- Bisectors of the angles for a line pair
- Lines joining the origin to the points of intersection of a curve and a line

2.3. Circle:

- Standard equation
- General form
- Tangents and normal

2.4. Parabola:

- Standard equation
- Tangents and normal

Unit 2. **Algebra:**

[12]

3.1. Progressions:

- A.P., G.P. and H.P.

3.2. Permutations and combinations

3.3. The binomial theorem for any index

3.4. Series:

- Exponential & logarithmic

3.4. Equations:

- Quadratic & polynomial

Unit 3. **Set relation and function:**

[8]

- 4.1 Idea of set, set notations, set operations,
- 4.2. Venn diagram,
- 4.3. The set of real members and its subsets.
- 4.4. The absolute value of a real number.
- 4.5. Functions- algebraic and transcendental.
- 4.6. Graphs of simple function.

Unit 4. **Calculus:**

[16]

- 5.1. Limit of community.
- 5.2. Derivatives from definition of simple functions like:
 - x^n , $(ax+b)^n$, $\sin(ax+b)$, e^{ax} , a^x , and $\log x$.
- 5.3. Derivatives of sum, difference, product and quotient of functions, chain rule, parametric and implicit functions
- 5.4. Integration, Rules for finding integrals.
- 5.5. Standard integrals and their uses.
- 5.6. Definite integrals- definition and evaluation.
- 5.7. Definite integral as limit of sum.

Learning materials:

1. A Textbook on Engineering mathematics (for Diploma Engineering) part I, Bhim Prasad kafle, Makalu Publicartion House, Dillibazar, Kathmandu
2. A Text book of Statistics – B.C. Bajracharya
3. Elementary Statistics – H. C. Saxena
4. Statistical Methods – Mrigendralal Singh
5. Engineering Mathematics I, Hari Nandan Nath, Parishowar Acharya, Vudhyarthi Publisher and distributors, Bhotahity, Kathmandu
6. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject.
7. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject

Engineering Physics I

EG 1104 SH

	Total: 6 hour /week
Year: I	Lecture: 3 hours/week
Semester: I	Tutorial: 1 hours/week
	Practical: hours/week
	Lab: 2 hours/week

Course Description:

This subject consists of four units related to mechanics, heat and thermodynamics, optics, and magnetism necessary to develop background in physics that supports for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to explain the basic concepts related to the followings and apply them in the field of the related engineering area.

1. Mechanics.
2. Heat and thermodynamics.
3. Optics.
4. Magnetism.

Course Contents:

Unit 1. Mechanics:	[15]
1.1 Basic units and measurements:	
<ul style="list-style-type: none">• Measurement of physical quantities• Introductory ideas about dimensions of physical quantities.• Scalar and Vector: definitions and examples, dot and cross product of two vectors• Composition and resolution of vectors (Triangle law and parallelogram law of vectors)	
1.2 Newton's laws of motion:	
<ul style="list-style-type: none">• Newton's laws of motion (First, second and third laws)• Principle of conservation of linear momentum	

- Solid friction: Dynamic and rolling friction, laws of solid friction and its verification
- 1.3. Uniform circular motion:
- Angular displacement and velocity.
 - Centripetal force and acceleration.
 - Motion of bicycle rider
- 1.4. Gravitation:
- Newton's law of universal gravitation.
 - Gravitational attraction of earth:
 - Acceleration due to gravity.
 - Variation of acceleration due to gravity with height, depth, and latitude.
 - Motion of satellites:
 - Orbital velocity,
 - Geostationary satellites.
 - Weightlessness, motion of lift
- 1.5. Work, energy, and power:
- Definition and units of work, energy and power.
 - Potential and kinetic energy.
 - Conservation of energy.
 - Conservative forces.
- 1.6. Simple harmonic motion (SHM):
- Simple harmonic motion and its characteristics.
 - Energy of simple harmonic motion.
 - Simple pendulum.
- 1.7. Equilibrium and rotation of rigid bodies:
- Forces in equilibrium, torque, couple, C.G. and center of mass.
 - Moment of inertia.
 - Angular momentum and
 - Its conservation.
 - Work done by torque.

Unit 2. Heat and thermodynamics:

[12]

2.1 Heat Phenomena and Quantity of Heat:

- Concept of temperature and thermal equilibrium.
- Temperature of scales.
- Quantity of heat gain or heat loss.
- Specific heat capacity.
- Determination of heat capacity by the method of mixtures.
- Newton's law of cooling.

2.2 Change of Phase:

- States of matter.

- Fusion and vaporization.
 - Evaporation and boiling.
 - Specific latent heats of fusion and vaporization.
 - Melting and boiling points.
 - Introduction of Saturated and unsaturated vapors.
 - Variation of melting and boiling points with pressure.
 - Triple point and critical point.
 - Dew point and humidity.
- 2.3 Thermal Expansion:
- Coefficients of linear, superficial and cubical expansions of solid and relation between them.
 - Cubical expansion of liquids.
 - Real and apparent expansions.
 - Variation of density due to expansion.
- 2.4 Heat Transfer:
- Thermal conduction and thermal conductivity
 - Convection
 - Radiation.
 - Perfectly black body.
 - Stefan-Boltzman's law of black body radiation.
- 2.5 Gas Laws:
- Boyle's law,
 - Charles law and ideal gas equation.
 - Universal gas constant,
 - Avogadro number and Boltzman constant.
 - Volume and pressure coefficients of ideal gas.
- 2.6 Kinetic Theory of Gases:
- Pressure in an ideal gas from molecular point of view.
 - RMS speed, mean energy of a molecule of an ideal gas.
- 2.7 Thermodynamics:
- First law of thermodynamics.
 - Different thermodynamic process:
 - Adiabatic (equation and work done)
 - isothermal (equation and work done)
 - Isobaric and Isochoric
 - Specific and molar heat capacities for different thermodynamic processes, $C_p - C_v = R$.
 - Second law of thermodynamics.
 - Efficiency of heat engine

Unit 3. Optics:

- 3.1 Reflection by plane surfaces

[8]

- Nature of light, sources of light
 - Review of reflection by plane surfaces
 - Deviation due to reflection
 - Deviation of light due to plane mirror
 - Deviation of light due to rotating mirror
- 3.2 Refraction by plane Surfaces:
- Review of refraction by plane surfaces.
 - Lateral shift
 - Total internal reflection, critical angle
 - Real and apparent depth.
- 3.3 Reflection by Spherical Surfaces:
- Review of reflection by spherical surfaces.
 - Construction of image by ray diagrams and nature of images
 - Real and virtual images.
 - Nature of images formed by spherical mirrors.
 - Mirror formula for concave and convex mirror
- 3.4 Refraction through Prisms and Lenses:
- Deviation due to prism and minimum deviation.
 - Refraction through lenses.
 - Lens maker equation.
 - Lens formula for converging lens, diverging lens
 - Formation of images by lenses.
 - Combination of lenses.
 - Magnification,
 - Power of a lens.

Unit 4. Magnetism:

[10]

- 4.1 Magnets and Magnetic fields:
- Magnetic poles, magnetic moment, magnetic axis, and magnetic meridian.
 - Magnetic field.
 - Coulomb's law for magnetism.
 - Magnetic field due to magnetic poles and bar magnets.
 - Intensity and flux density of magnetic field.
 - Neutral point.
 - Tangent law.
- 4.2. Earth's Magnetism:
- Horizontal and vertical components of earth's magnetic field.
 - Declination and angle of dip.
- 4.3. Magnetic properties of materials;
- Molecular and modern theory of magnetism.
 - Para magnetism and diamagnetism:
 - Permeability and

- Susceptibility.
- Intensity of magnetization.
- Domain theory of ferromagnetism.
- Hysteresis

Engineering Physics Practical I

[30]

1. Determine volume of hollow cylinder by using vernier calipers.
2. Determine density of a steel / glass ball by using screw gauge.
3. Determine thickness of glass plate using spherometer and calculate the area by using millimeter graph paper.
4. Determine the acceleration due to gravity by using simple pendulum.
5. Determine the magnetic movement of a bar magnet by using deflection magnetometer.
6. Determine the refractive index of the material of prism.
7. Determine specific heat capacity of solid by the method of mixtures.
8. Determine specific latent heat of ice by the method of mixtures.
9. Determine specific gravity of different solids by up thrust method.
10. Determine focal length of a converging lens by displacement method.

Learning materials:

1. Advanced level physics by Nelkon and Parker
2. A textbook of physics, part I and part II by Gupta and Pradhan
3. Numerical problems in Engineering Physics for Diploma in Engineering I & II, Pankaj Sharma Ghimire & Krishna Shrestha, S.K. Books, Dhapasi, Kathmandu
4. Engineering Physics I, Diploma in Engineering (first Year, First part) by Dhan Prasad Poudyal, Khemnath Poudyal, Suresh Prasad Gupta, Binaya Devkota, Laxmi Pustak Bhandar E
5. Engineering Physics Practical Guide by U.P. Shrestha, RPB P

Other learning materials:

1. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject
2. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Chemistry I

EG 1105 SH

Year: I	Total: 6 hour /week
Semester: I	Lecture: 3 hours/week
	Tutorial: 1 hours/week
	Practical: hours/week
	Lab: 2 hours/week

Course Description:

This subject consists of three units related to general chemistry, language of chemistry, and system of classification necessary to develop background in chemistry that supports for the understanding and practicing related engineering works.

Course Objectives:

After the completion of this subject, students will be able to explain the basic concepts related to the followings and apply them in the field of related engineering works:

1. General chemistry
2. Language of chemistry
3. System of classification

Course Content:

Unit: 1: Language of chemistry: [4]

1.1 Symbol:

- Definition
- Significance (qualitative and quantitative)

1.2 Formula:

- Definition
- Significance (qualitative and quantitative)
- Concept of valency in terms of combining capacity with H₂, O₂, and Cl₂
- Variable valency (ref. Fe, Sn, Pb, Cu, Hg, S and N)
- Radicals (electro- positive and electro - negative)
- Writing a formula

1.3 Chemical equation:

- Definition
- Types requisites
- Significance and limitation

- Balancing of chemical equation by hit and trial method and Partial equation method

Unit: 2: General chemistry:

[8]

2.1 Atom and molecule:

- Definition
- Dalton's atomic theory and modern position of the theory

2.2 Atomic weight:

- Definition
- Determination of atomic weight by Dulong and Petit's method and Related numerical problems

2.3 Molecular Weight:

- Definition
- Avogadro's hypothesis
- Application of Avogadro's hypotheses (Mol. Wt= $2 \times V.D.$, in the deduction of atomicity of elementary gases H_2 , Cl_2 , O_2 , and N_2)
- Molecular weight determination by Victor Meyer's method and Related numerical problems

2.4 Equivalent weight:

- Definition
- Equivalent weight of element, acid, base and salt
- Equivalent weight determination by hydrogen displacement method and oxide method.
- Numerical relation between equivalent weight, atomic weight and valency
- Some related problems of equivalent wt. (From Hydrogen displacement method and oxide method)

2.5 Simple mole concept:

- Mole of an atom
- Mole of a molecule
- Molar volume and
- Simple calculation on mole concept

Unit: 3: System of classification:

[33]

3.1 Acid, Base and Salt:

- Arrhenius concept of acid and base
- Lowry and Bronsted concept of acid and base
- Conjugate acid and base
- Amphoteric nature of water

- Lewis concept of acid and base
 - Properties of acid and base.
 - Definition of Salt
 - Types of salt (normal, acidic and basic)
 - Concept of hydrogen ion concentration, pH value and pH Scale
 - Buffer solution.
- 3.2 Volumetric analysis:
- Definition of titration (acidimetry and alkalimetry),
 - Indicator
 - End-point (neutralization point)
 - Standard solution (primary and secondary standard solution), Normal, Decinormal, Molar, Molal solution
 - Requisites of primary standard substance
 - Volumetric equation,
 - Express the strength of solution Normality, Molarity, Molality, gram per litre and percentage and related numerical problems
- 3.3 Periodic table:
- Mendeleef's periodic law
 - Mendeleef's periodic table
 - Characteristics of groups and periods in the table
 - Advantages and anomalies of the periodic table
 - Modern periodic law
- 3.4 Electronic theory valency:
- Assumptions
 - Types
 - Electrovalency eg. NaCl, MgO, CaS
 - Covalency eg. H₂, O₂, N₂, CH₄, H₂O, NH₃, C₂H₂
 - Coordinate co-valency eg. H₂O₂, SO₂, O₃, SO₃)
 - Electronic dot structure of some compounds eg. H₂SO₄, CaCO₃, K₂SO₃
- 3.5 Electrolysis:
- Definition of electrolyte, non-electrolyte and electrolysis
 - Faraday laws of electrolysis,
 - Application of electrolysis (electroplating and electro refining)
 - Electrolysis of acidulated water
- 3.6 Oxidation and reduction:
- Classical definition
 - Electronic interpretation
 - Oxidizing agent: Definition and eg O₂, O₃, oxyacids, halogens, K₂Cr₂O₇, KMnO₄
 - Reducing agent: Definition and eg. H₂, H₂S with some examples,
 - auto-oxidation eg. H₂O₂, HNO₂, SO₂

- Idea of oxidation number
- Balancing chemical equation by oxidation number method

3.7 Atomic structure:

- Subatomic particles (electron, proton and neutron)
- Classical α - rays scattering experiment
- Rutherford's atomic model and its drawbacks
- Bohr's atomic model (postulates only)
- Composition of nucleus
- Mass number and atomic number
- Isotopes and isobar
- Arrangement of electron (Bohr - Bury Scheme)
- Concept of shell and sub shell,
- Electronic Configuration and atomic structure of Some elements (Atomic no. 1 to 30)
- Hund's rule
- General idea of quantum number and Pauli's exclusion principle

3.8 Corrosion:

- Definition
- Types
- Direct and indirect method and prevention against corrosion

3.9 Activity and electrochemical series:

- Definition
- Action of water, acid and oxygen on metals.

Engineering Chemistry Practical I

[30]

1. Simple Glass Working [6]

- a. to cut the glass tube into three equal parts and round up their shape edges
- b. to bore a hole through a cork
- c. to bend the glass tubing into acute, obtuse and right angle
- d. to draw a jet and capillary tube
- e. to fit up a wash bottle

2. To separate sand and copper sulphate crystals in pure and dry state from the mixture of sand and copper sulphate [2]

3. To separate sand and calcium carbonate in pure and dry state from the mixture of sand and calcium carbonate [2]

4. To prepare pure water from supplied impure water by distillation and to test the purity of the sample prepared [2]
5. To neutralize dilute sulphuric acid with sodium carbonate solution, and to recover crystals of sodium sulphate [2]
6. To obtain pure and dry precipitate of barium sulphate by treating excess of dilute sulphuric acid with barium chloride solution [2]
7. To investigate the composition of water by electrolysis by using Hofmann's apparatus [2]
8. To determine the equivalent weight of reactive metal by hydrogen displacement method. [2]
9. To determine the pH of different unknown solution and using pH paper and universal indicator [2]
10. To prepare primary standard solution of sodium carbonate and to use it to standardize an approximate decinormal acid solution [2]
11. To standardize given unknown acid (Approx N/10) solution by preparing standard alkali solution. (Expression of strength in different ways) [2]
12. To standardize given unknown alkali (approximately N/10) solution with the help of by preparing standard acid solution. (Expression of strength in different ways) [2]
13. To carry out conductivity experiments on solids and liquids (CuSO₄, Zn, Mg, Al, Fe, CCl₄, C₆H₆, C₂H₅OH) [2]

Text books:

1. A Text book of Chemistry, Jha and Guglani
2. Foundations of Chemistry, Vol. 1, M.K. Sthpit and R.R. Pradhananga

Reference books:

1. Fundamentals of Chemistry, K.R. Palak
2. Inorganic Chemistry, Bahl and Tuli
3. A Text book of Engineering Chemistry, R.S. Sharma
4. A Textbook of Inorganic Chemistry, L.M. Mitra
5. Elementary practical chemistry, M.K Sthpit
6. Engineering Chemistry, M.L. Sharma, K. M. Shrestha, PN, Choudhary
7. A Textbook of Engineering Chemistry, Prakash Poudel

Other learning materials:

1. Other references to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject
2. **Note:** The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Survey Drawing I

EG 1106 GE

Year: I
Semester: I

Total: 8 hours/week
Lecture: hours/week
Tutorial: 2 hours/week
Practical: 6 hours/week

Course Description:

This course consists of fundamental concept of manual drawing skills applicable in surveying and mapping.

Course Objectives:

After the completion of this course, students will be able to:

- Identify the drawing tools and equipments required for different drawing tasks
- Understand the surveying related drawings
- Draw and understand map symbols (point, line and area symbol)
- Enlarge and reduce a map fragment
- Understand the techniques of map copying

Course Contents:

Unit 1: Introduction	[2hrs]
1.1 Definition of Drawing	
1.2 Engineering and Survey Drawing	
1.3 Uses of Drawing	

Unit 2: Equipments and Materials	[3hrs]
2.1 Introduction	
2.2 Different types of (Manual) Drawing Equipments and Materials (Media)	
2.3 Uses of Drawing Equipments and Materials	
2.4 Quality of Drawing Materials and Ink	
2.5 Maintenance and Care of Drawing Equipments	
2.6 Choice of Appropriate Drawing Equipments and Materials	

Practical:

1	Demonstration of <i>Different Drawing</i> Equipments and Materials	[4hrs]
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Unit 3: Geometrical Drawings	[2hrs]
1.1 Introduction	
1.2 Plane Figures (Regular and Irregular)	

Practical:

1	Construct Triangles for each type (Equilateral, Isosceles and Scalene)	[4hrs]
2	Construct Quadrilaterals for each type (Square, Rectangle, Rhombus, Trapezoid)	[4hrs]
3	Construct Regular Polygons for each type (Pentagon, Hexagon, Heptagon, Octagon)	[6hrs]
4	Divide a given straight into any number of equal parts	[3hrs]

Unit 4: Drawing Techniques [5 hrs]

- 3.1 Types and Sizes of Letters
- 3.2 Devnagari and Roman Letters
- 3.3 Mechanical Lettering: Lettering Sets
- 3.4 Different Types of Lines
- 3.5 Format of Grid Sheet and Margin
- 3.6 Scales: Types, Construction and Use
- 3.7 Graphical) Enlargement and Reduction of Map Scale
- 3.8 Conventional Signs and Symbols
- 3.9 Types of Charts: Bar Diagram, Pie-diagram (Pie-Chart)

Practical:

- 1 Write 2 Full Pages Devanagari Letters of different sizes [10hrs]
- 2 Write 2 Full Pages Roman Letters of different sizes [8hrs]
- 3 Write 1 Full Page using Lettering Set [4hrs]
- 4 Draw different line types with different thicknesses [4hrs]
- 5 Construct a Grid (Square) in A4 size paper by hand [4hrs]
- 6 Construct Plain Scale (Single line and Double line) [4hrs]
- 7 Construct Diagonal Scale [4hrs]
- 8 Draw different Symbols used in Cadastral and Topographic maps of Nepal [16hrs]
- 9 Trace a fragment of a Cadastral Map (A4 size Paper) [4hrs]
- 10 Enlarge and Reduce a piece of Cadastral Map (Graphically) [4hrs]
- 11 Prepare Bar diagram and Pie-Diagram from the given Data [4hrs]

Unit 5: Freehand Sketching [1hrs]

- 2.1 Introduction
- 2.2 Sketching Materials
- 2.3 Proportion; Estimation of Distance and Direction
- 2.4 Use of Sketching in Surveying and Mapping

Practical:

- 1. Prepare a Freehand Sketch of the given area (School Compound) and Ink [2hrs]

Unit 6: Copying [2hrs]

- 4.1 Introduction
- 4.2 Ammonia Printing

Practical:

- 1 Perform an Ammonia printing of a Cadastral Map [6hrs]

Test and Revision [10 hrs]

Reference Book

- 1. *Fundamental of Engineering Drawing*, Warven J. Cauzadder (2001)
- 2. *Engineering Drawing Volume 1 and 2* by K.R. Gopalkrishna
- 3. *Engineering Drawing and AutoCAD*, K. Venugopal (2001)
- 4. *Basic Cartography Vol I*, International Cartographic Association
- 5. *Elements of Cartography*, H. Robison
- 6. *Cartography for Mapping*. Rabin Kaji Sharma

Survey Instruments I

EG 1107 GE

Year:
Semester: I

Total: 12 hours /week
Lecture: hours /week
Tutorial: 2 hrs/week
Practical: 10 hrs/week

Course Description:

This part of the course deals with Ranging equipments, Surface Distance measuring instruments, Direction measurements by compass and Graphical surveying instruments

Course Objectives:

After the completion of this course, students will

- be acquainted with and be able to explain the use of different instruments used for Ranging Lines and Offsets on the earth's surface.
- be able to use instrument for surface distance measurements on the earth's surface.
- be able to explain the elements of Direction measurements and Bearings.
- Be acquainted with and be able to explain the use of magnetic compass
- be acquainted with and be able to explain the use of conventional graphical surveying instrument- The plane table and accessories
- be skilled in carrying out various land surveying tasks using Plane Tabling equipments.

Course Guidelines

The students shall be required to carry out the following tasks for each instrument / equipment listed in the course content:

1. Practice with the instrument in the field
2. Prepare drawing/s related with the instrument/equipment in the form of neat labelled diagram/s
3. Prepare practical sheets document containing Relevant drawing/s, Description, Components, Types, Accessories, Principle, Adjustments, Functions and Use, Care, Operational/Field procedure and observation record, and relevant solution of practical/numerical problems

Course Contents:

Unit 1: Ranging Instruments	(15hrs+25hrs)
1.1 Pegs and Ground Marks	
1.2 Ranging Pole	
1.3 Plumb Bob	
1.4 Line Ranger	
1.5 Cross Staff	
1.6 Optical Square	
Unit 2: Distance Measuring Instruments	(15hrs+25hrs)

- 2.1 Surveyor's Chain
2.2 Measuring Tape
- Unit 3: Direction and Compass (15hrs+35hrs)**
- 3.1 Principle of Direction Measurements
- Reference Planes (Horizontal, Vertical, Inclined).
 - Reference Axes for measuring angles between points on the earth surface. (Horizontal, Vertical, Collimation).
- 3.2 Direction elements:
- Meridians and types of meridians used
 - Bearing , types of bearings and conversion of bearings
 - Magnetic Declination
- 3.3 Essential components in a direction measuring instrument
3.4 Instrument for direction measurements - Magnetic Compass
3.5 Instrument for direction measurements - Surveyor's compass
- Unit 4: Graphical Surveying Instruments (15hrs+35hrs)**
- 4.1 Plane Table
4.2 Sight Rule
4.3 Telescopic Alidade and Staff
4.4 Indian Clinometer

Reference Books

1. *Surveying Vol. I Dr. B.C Punmia, Laxmi Publication Pvt.Ltd*
2. *Surveying Vol. I S.K. Duggal, Tata McGraw- Hill Publishing Company Ltd. New Delhi*
3. *Principles and use of Surveying Instruments, J. Clendinning, J.G Oliver*

Second Semester

EG1201SH	Communicative English II
EG1202SH	Social Studies
EG1203SH	Engineering Mathematics II
EG1204SH	Engineering Physics II
EG1205SH	Engineering Chemistry II
EG1206GE	Computer Application
EG1207GE	Survey Instruments II

Communicative English II

EG1202SH

Year: I
Semester: II

Total: 2 hour /week
Lecture: 2 hours/week
Tutorial: hours/week
Practical: hours/week

Course Description:

This course consists of four units related to practice based communicative English; writing skills in English; English sounds and structures; and English conversation practices so as to equip the students with the skills and knowledge of communication in English language in order to have an effective and efficient job performance through occupational communication in the workplace.

Course Objectives:

After the completion of this subject, students will be able to:

6. Communicate in English language at work/job environment
7. Define and use trade related technical terminologies
8. Demonstrate various writing skills related to the job
9. Demonstrate situational/structural conversation essential for job performance

Course Contents:

Unit 1. Communicative English:

[3]

- 1.1 The correct usage:
 - Introduction
 - Grammatical units:
 - Subject –verb agreement
 - Nouns and pronouns
 - The adjectives
 - The articles
 - The verbs
 - The adverbs
 - The prepositions
 - The conjunctions
- 1.2 The grammatical structures:
 - The order of words
 - The idioms
 - The punctuation
 - The spelling
 - The formation of words
 - Figures of speech
 - The verb patterns
 - Question tags, short answers, etc.
 - More structures
- 1.3. Everyday functions ii.
- 1.4. Asking about trouble/problem.
- 1.5. Inviting to join an activity.
- 1.6. Asking about / expressing.
- 1.7. Asking about / stating.

- 1.8. Functions of English.
- 1.9. Dictionary usage
- 1.10. Reading comprehension
- 1.11. Collection and definitions of job related terminologies

Unit 2. Writing skills in English: [15hrs]

- 2.1. Writing comprehension
- 2.2. Writing Dialogues
- 2.3. Paraphrasing
- 2.4. Writing Responses:
 - Complaint letters
 - Social letters
 - Response to business letters
 - Response to Invitation letters
- 2.5. Documentation
 - In text citation
 - Bibliography
- 2.6. Essay Writing
 - Descriptive essay
 - Argumentative essay
 - Cause and effect essay
 - Comparative essay
- 2.7. Report Writing
 - Prepare an academic report practically

Unit 3. English sounds and structures: [4]

- 3.1 Individual oral presentation
- 3.2 Reinforcement of Sounds of English:
 - The vowels
 - The consonants
 - Consonant clusters
 - Vowel sequences
 - Syllable structure
 - Stress
 - Intonation
- 3.3 Dictionary usage

Unit 4. Trade Related terminologies [3]

- Surveying & Mapping
- Geomatics
- Remote Sensing and GIS
- Land Management

Test and revision [5]

Reference Books:

1. Poudel, R.C., A Manual to Communicative English, K.P.Pustak Bhandar, Kathmandu, 1956/57.
2. Shah ,B.L., A text book of writing skills in English, First edition Hira Books Enterprises, Kathmandu,
3. Fruehling, R. T. and Oldham N. B., Write to the point, McGraw- Hill, Inc. New York NY 10020
4. Tayior, G., English conversation practice, 1975.
5. Maharjan L. B..A textbook of English sounds and Structures, Vidyarthi Pustak Bhandar, Kathmandu, 2000.
6. Todd, LAN introduction to Linguistics, Longman York press, 1991.

सामाजिक अध्ययन
ई.जी. २२०६ एस.एच.

वर्ष : दोस्रो
सेमेष्टर : दोस्रो

जम्मा : २ घण्टा/ हप्ता
प्रवचन : २ घण्टा/ हप्ता
विशेष : घण्टा/ हप्ता
प्रयोगात्मक : घण्टा/ हप्ता
प्रयोगशाला : घण्टा/ हप्ता

पाठ्यक्रमको परिचय :

सामाजिक अध्ययन विषयको पाठ्यक्रमको मूल उद्देश्य नेपालको वस्तुस्थिति विशेषतः भौगोलिक जानकारी संक्षेपमा दिई प्राविधिक विद्यार्थीहरूलाई नेपालका विविध पक्षबाट परिचित गराउनु हो। सामाजिक अध्ययनको पाठ्यक्रम डिप्लोमा इन्जिनियरिङ तहमा पढ्ने विद्यार्थीहरूका लागि इतिहास, संस्कृति, भूगोल, अर्थशास्त्र, राजनीतिशास्त्र, समाजशास्त्र, मानवशास्त्र, जनसंख्या शिक्षा, वातावरण शिक्षा आदिका विषयवस्तुलाई एकीकृत गरी निर्माण गरिएको छ।

पाठ्यक्रमको उद्देश्य :

यस पाठ्यक्रमको अध्ययनपछि मध्यम स्तरीय प्राविधिक विद्यार्थीहरू निम्नलिखित विषयमा सक्षम हुनेछन् :

- क) विश्वमानचित्रमा नेपालको परिचय दिन।
- ख) नेपाल शब्दको उत्पत्तिबारे जानकारी दिन।
- ग) सामाजिक विज्ञान-मानव र समाजको सामान्य जानकारी दिन।
- घ) नेपालको आर्थिक व्यवस्थाको विशेषताहरूसहित कृषि, व्यापार, उद्योग, यातायात, सञ्चारको सामान्य परिचय दिन।
- ङ) नेपालको छिमेकी तथा मित्रराष्ट्र भारत र चीनसँगको सम्बन्धको छोटकरीमा परिचय तथा असंलग्न परराष्ट्र नीति, संयुक्त राष्ट्रसंघ, सार्कबारे छोटकरीमा जानकारी गराउन।
- च) नेपालको शासन व्यवस्थाका प्रमुख अङ्गहरू र संविधान, विकेन्द्रीकरणको सामान्य परिचय दिन।
- छ) सामाजिक तथा सांस्कृतिक परिवर्तनसम्बन्धी जानकारी दिन।
- ज) वातावरण, सामाजिक सेवा र सामुदायिक विकास, सामाजिक अनुसन्धान, जनसंख्या शिक्षासम्बन्धी सामान्य जानकारी दिन।

एकाइ	पाठ्यांश विवरण	पाठ घण्टा
१.	सामाजिक अध्ययन तथा सामाजिक विज्ञानको परिचय	४
	क) सामाजिक अध्ययनको अर्थ, क्षेत्र, महत्व	२
	ख) सामाजिक अध्ययनको सामाजिक विज्ञानसँग सम्बन्ध	
	ग) सामाजिक अध्ययनको अन्य विषयसित सम्बन्ध	
	घ) सामाजिक अध्ययन र सामाजिक विज्ञानबीच भिन्नता	
	ङ) समाजशास्त्र र ग्रामीण समाजशास्त्रको परिचय	१
	च) समाजशास्त्रको प्रकृति र वैज्ञानिक पद्धति	
	छ) सामाजिक विज्ञान र भौतिक विज्ञानबीचको अन्तर	
	ज) विज्ञान र इन्जिनियरिङ	१
	झ) विज्ञान र प्रविधि	
ञ) विज्ञान र धर्म		
ट) विज्ञान र समाज		
२.	मानव र समाज	२
	क) समाज, संस्कृति र व्यक्तित्व, बानी, परम्परा र फेसन	१

	ख) जाति, भाषा, धर्म, पेसा, रहनसहन र चाडपर्व	१
	ग) समाजमा महिलाहरूको स्थिति	
३.	सामाजिक तथा सांस्कृतिक परिवर्तन	४
	क) सामाजिक तथा सांस्कृतिक परिवर्तनका अर्थ	१
	ख) सामाजिक तथा सांस्कृतिक परिवर्तनका सिद्धान्तहरू	
	ग) सामाजिक परिवर्तनको विशेषताहरू	१
	घ) सामाजिक र सांस्कृतिक परिवर्तनका कारक तत्वहरू	
	ङ) औद्योगिकीकरण र सामाजिक परिवर्तन	१
	च) ग्रामीण सामाजिक जनजीवनमा प्रविधिको प्रभाव	
	छ) औद्योगिक र ग्रामीण समाजका विशेषताहरू	१
	ज) सहरीकरण	
४.	वातावरण र पर्यावरण	१
	क) वातावरण र पर्यावरणको अर्थ	
	ख) वातावरण संरक्षणको आवश्यकता र महत्व	
५.	सामाजिक सेवा र सामुदायिक विकास	२.५
	क) सामुदायिक विकास परियोजनाको अर्थ र उद्देश्य	१
	ख) सामुदायिक विकास कार्यक्रम	
	ग) जनसहभागिता र सामुदायिक विकास	०.५
	घ) सामाजिक सेवाको अर्थ, क्षेत्र र उद्देश्य	१
	ङ) सामाजिक कार्यकर्ताको अर्थ, प्रकार, गुण र भूमिका	
६.	सामाजिक अनुसन्धान	२
	क) परिभाषा, प्रकृति, उद्देश्य र प्रकार	०.५
	ख) सामाजिक अनुसन्धानका प्रेरकताहरू	१.५
	ग) सामाजिक अनुसन्धानका प्रमुख चरण	
	घ) सामाजिक अनुसन्धान प्रतिवेदन तयार गर्ने ढाँचा	
७.	हाम्रा स्रोतहरू	२
	क) मानवशक्ति	१
	ख) जलस्रोत	
	ग) भूमि	
	घ) वनसम्पदा	०.५
	ङ) खनिजशक्ति	
	च) सौर्यशक्ति	०.५
	छ) वायुशक्ति	
८.	नेपाल शब्दको उत्पत्ति	१
९.	विश्वमानचित्रमा नेपाल	१
१०.	आर्थिक अवस्था	२
	क) कृषि, व्यापार, उद्योग, यातायात र सञ्चारको महत्व	१
	ख) आर्थिक व्यवस्थाका विशेषताहरू	१
	कृषिजन्य अर्थव्यवस्था, मिश्रित अर्थव्यवस्था, साभ्का अर्थव्यवस्था, योजनाबद्ध विकास	
११.	परराष्ट्र नीति	३
	क) नेपालको असंलग्न परराष्ट्र नीतिको अर्थ	१
	ख) नेपालको परराष्ट्र नीतिका विशेषताहरू	
	ग) नेपाल भारत सम्बन्ध	०.५
	घ) नेपाल चीन सम्बन्ध	०.५
	ङ) संयुक्त राष्ट्रसंघ र नेपाल	१
	च) सार्क र नेपाल	
१२.	शासन व्यवस्था	३.५

क) व्यवस्थापिका	०.५
ख) कार्यपालिका	०.५
ग) न्यायपालिका	०.५
घ) संविधान, संविधानसभा, अन्तरिम संविधानको छोटो परिचय	१
ङ) नेपाल अधिराज्यको संविधान २०४७ को विशेषताहरू	०.५
च) विकेन्द्रीकरण, महत्व, आवश्यकता र विशेषताहरू	०.५
१३. जनसंख्या शिक्षा	२
क) जनसंख्या शिक्षाको परिचय	१
ख) जनसंख्या शिक्षाको उद्देश्यहरू	
ग) जनसंख्या वृद्धि र नियन्त्रण	१

पाठ्यपुस्तक

१. सामाजिक अध्ययन, सिद्धीश्वरमान श्रेष्ठ, डा. राजेन्द्रप्रसाद अधिकारी, सावित्री श्रेष्ठ, अक्षलोक, प्रकाशन, काठमाडौं ।

सन्दर्भ पुस्तक

१. नेपाल अधिराज्यको संविधान २०४७, कानून, न्याय तथा संसदीय व्यवस्था मन्त्रालय, कानून किताब व्यवस्था समिति, काठमाडौं, २०४७ ।
२. नेपाल अधिराज्यको संविधान २०४७ : एक टिप्पणी, खिमलाल देवकोटा, निरन्तर प्रकाशन, काठमाडौं, २०५८ ।
३. नेपाल परिचय, सिद्धीश्वरमान श्रेष्ठ, प्रा. श्यामकृष्ण जोशी, सावित्री श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं, २०६५/०६९ ।
३. नेपालको अन्तरिम संविधान २०६३ ।
४. नेपालको सरकार र प्रशासन, सिद्धीश्वरमान श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं, २०५० ।
५. नेपाली बृहत् शब्दकोष, नेपाल राजकीय प्रज्ञा-प्रतिष्ठान, काठमाडौं, २०५२ ।
६. नेपाली महिला र जनआन्दोलन २०६३, सावित्री श्रेष्ठ, अक्षलोक प्रकाशन, २०६३ ।
७. प्रश्नोत्तर नेपाल परिचय, सावित्री श्रेष्ठ, सिद्धीश्वरमान श्रेष्ठ, निरन्तर प्रकाशन, काठमाडौं, २०५०, २०५८ (तेस्रो संस्करण) ।
८. वातावरण शिक्षा स्रोत सङ्गालो, राष्ट्रिय संरक्षण कार्यनीति कार्यान्वयन आयोजना, काठमाडौं, २०५० ।
९. महत्वपूर्ण राजनीतिक शब्दज्ञान, सिद्धीश्वरमान श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं, २०५५, २०५८, २०६६ ।
१०. मुद्रा, बैङ्किङ, राजस्व, अन्तर्राष्ट्रिय व्यापार तथा नेपालको अर्थव्यवस्था, महेश्वरमान श्रेष्ठ, रत्न पुस्तक भण्डार, काठमाडौं, २०५१ ।
११. राजनीतिशास्त्रको परिचय, सिद्धीश्वरमान श्रेष्ठ, निरन्तर प्रकाशन, काठमाडौं, २०५०, २०५८ (दोस्रो संस्करण) ।
१२. सामाजिक अनुसन्धान प्रविधि, प्रभाकर लाल दास, श्री जय नारायण, सप्तरी, २०५४ ।
१३. सामाजिक अध्ययन (हेल्थ साइन्स), सिद्धीश्वरमान श्रेष्ठ, सावित्री श्रेष्ठ, अक्षलोक प्रकाशन, काठमाडौं, २०६७ ।

Engineering Mathematics II

EG 1201 SH

	Total: 4 hour /week
Year: I	Lecture: 3 hours/week
Semester: II	Tutorial: 1 hours/week
	Practical: hours/week
	Lab: hours/week

Course Description:

This subject consists of five units related to vectors; algebra; calculus; geometry; and statistics necessary to develop mathematical background helpful for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to:

1. Explain the concepts of vectors in plain and vectors in space and apply them in the field of the related engineering area
2. Explain the concepts of the complex numbers, linear inequalities and programming apply them in the field of the related engineering area.
3. Explain the concepts of determinants and matrices and apply them in the field of the related engineering area
4. Explain the concepts of determinants and matrices and apply them in the field of the related engineering area
5. Explain the concepts of applications of derivatives and areas of curves and apply them in the field of the related engineering:
6. Explain the concepts of coordinates in space and planes and apply them in the field of the related engineering area
7. Explain the concepts of statistics and apply them in the field of the related engineering area.

Course Contents:

Unit 1.	Vectors:	[9]
	1.1. Vectors in plane, addition and subtraction.	
	1.2. Composition and decomposition of vectors.	
	1.3. Vectors in space.	
	1.4. The unit vectors i, j, k	

1.5. Product of two vectors-

- dot product,
- cross product,

1.6. Simple applications.

Unit 2. Algebra: [15]

2.1. Complex number in the form $A + ib$.

- Algebra of complex numbers.
- Polar representation of complex numbers.

2.2. De Moivre's theorem and its applications

2.3. Linear inequalities and their graphs.

- System of linear inequalities in two variables,
- System of linear inequalities in two variables,
- Linear programming: Problems involving two variables under given linear constraints

2.4. Determinants and matrices,

- Algebra of matrices,
- Properties of determinants,
- Ad joint and inverse of matrices.
- Solution of linear equations using Cramer's rule
- Row equivalent matrices
- Idea of polynomial equations

Unit 3. Calculus: [9]

3.1. Applications of derivatives-

- Tangents and normal to a curve taking slope as derivative
- Maxima and minima of a function
- Derivative as rate of change

3.2. Areas under curves:

- Use of definite integral as limit of a sum to find areas under curves
- Areas of closed curves and
- Areas between curves.

3.3. Antiderivatives:

- Curve tracing, maxima and minima
- Riemann sums & integral
- Application of fundamental theorem

Unit 4. Geometry: [6]

4.1. Coordinates in space,

4.2. Coordinates in planes.

Unit 5. Statistics: [6]

5.1. Statistics:

- Introduction to statistics
- Measures of Central Tendency
- Measures of Dispersion
- Moments, Skew ness and Kurtosis
- Correlation and Regression

5.2. Probability:

- Concept of Probability
- Concept of conditioned probability
- Concept of independent and dependent events
- Concept of mutually exclusive events

Learning materials:

1. A Textbook on Engineering mathematics (for Diploma in Engineering) part II, Bhim Prasad kafle, Makalu Publicartion House, Dillibazar, Kathmandu
2. A Text book of Statistics – B.C. Bajracharya
3. Elementary Statistics – H. C. Saxena
4. Statistical Methods – Mrigendralal Singh
5. Engineering Mathematics I, Hari Nandan Nath, Parishowar Acharya, Vudhyarathi Publisher and distributors, Bhotahity, Kathmandu
6. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject.
7. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject

Engineering Physics II

EG 1202 SH

Year: I

Semester: II

Total: 6 hour /week

Lecture: 3 hours/week

Tutorial: 1 hours/week

Practical: hours/week

Lab: 2 hours/week

Course Description:

This subject consists of four units related to electricity, waves, properties of matter, and modern physics necessary to develop background in physics that supports for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to:

1. Explain the basic concepts related to the electricity and apply it in the field of the related engineering area
2. Explain the basic concepts related to the waves and apply it in the field of the related engineering area
3. Explain the basic concepts related to the properties of matter and apply it in the field of the related engineering area
4. Explain the basic concepts related to the modern physics and apply it in the field of the related engineering area.

Content Contents:

Unit 1. Electricity:

[16]

1.1. Electrostatics:

- Elementary charge, charging and induction.
- Faraday's ice-pail experiment.
- Idea of electric field
- Lines of forces.
- Coulomb's law.
- Intensity of electric field.
- Electrostatic potential, equipotential.
- Surfaces.

- Potential and field strength.
- Potential gradient.
- Action of point.
- Van de Graaf generator.
- Capacitors.
- Different types of arrangement of capacitors.
- Energy storage.
- Action of dielectrics

1.2. Current electricity:

- Basics:
- D.C. Current.
- Strength of Current.
- Potential difference across a conductor.
- Ohm's law and its verification.
- Resistance and resistivity.
- Electrical measurements:
- Galvanometer, Ammeter and voltmeter
- Conversion of Galvanometer into Ammeter and voltmeter
- Potentiometer and comparison of emf and measurement of internal resistance
- Kirchhoff's law and their use to analyze simple circuits, Wheatstone bridge
- Heating effect of current:
- Joules law and its verification, electric power, maximum power theorem
- The rate of heating from the concept of p.d.
- Thermoelectricity:
- Seebeck effect, variation of thermo e.m.f. with temperature
- Peltier effect and
- Thomson effect.

1.3. Magnetic effect of current and electromagnetism:

- Magnetic forces and magnetic field of current:
- Force experienced by charge moving in magnetic field.
- Maxwell's corkscrew rule.
- Force applied by magnetic field on current carrying conductor.
- Torque on current carrying coil in magnetic field.
- Theory of moving coil galvanometer.
- Biot-Savart's Law
 - Field due to a long straight conductor and due to circular coil.
 - Force between two parallel conductors carrying current.
- Ampere's law
 - Magnetic field due to the solenoid and long straight conductor.
- Electromagnetic induction:
- Faraday's law of electromagnetic induction and Lenz's law.
- Phenomenon of self-induction.

- A.C. generator.
- D.C. generator.
- Transformer.

1.4 Alternating current:

- Instantaneous and effective values of current and voltage.
- Phase between current and voltage across different elements of circuit.
- Capacitive and inductive reactance.
- Impedance.
- Resonance.
- Power in a.c. circuit

Unit 2. Waves:

[9]

2.1. Wave motion:

- Wave motion.
- Types of wave motion
- Characteristics of wave motion
- Wavelength, frequency and speed of waves
- Speed of waves in different media.
- Velocity of sound in air.

2.2. Wave phenomena:

- Sound waves.
- Beats and their formation.
- Progressive waves.
- Stationary waves.
- Waves in strings and pipes: fundamental vibrations and overtones.
- Intensity of sound.
- Intensity level.
- Inverse square law.

2.3. Physical optics:

- Interference of light waves and coherent sources.
- Phase difference and path difference. Young's double slit experiment.
- Introduction of Diffraction of light waves.
- Introduction of Huygen's principle.
- Polarization and unpolarized lights, polarization by reflection (Brewster's law)

Unit 3. Properties of matter:

[10]

3.1 Elasticity:

- Elasticity, Hook's law, Young's modulus, Bulk modulus
- Elasticity of shear.

3.2 Surface tension:

- Intermolecular attraction in liquid, surface tension.
- Cohesion and adhesion, angle of contact, capillary action
- Coefficient of surface tension and surface energy (Only introduction).

3.3 Viscosity:

- Stream line and turbulent flows.
- Idea of liquid layer, Velocity gradient, Viscosity and its coefficient.
- Comparison of viscosity with solid friction, Viscous forces, Stoke's law, Terminal velocity, determination of coefficient viscosity

Unit 4. Modern physics:

[10]

4.1 Atomic physics:

- Photons, Photoelectric effect, Einstein's photoelectric equation and stopping potential for photoelectrons.
- Motion of charged particles in simultaneously applied electric and magnetic fields, e/m for electron, Milliken's oil drop experiment. Bohr model for hydrogen atom. Energy level diagrams and spectral series.
- X-rays: Production, nature and uses.
- Laser (introduction only)

4.2 Semiconductors:

- Energy states of valent electrons in solids, energy bands.
- Semiconductors, intrinsic and doped, p-type and n-type semiconductors.
- Majority and minority carries.
- Acceptors and donors, p-n junction, diode and depletion layer, forward and reverse bias.
- Rectifying property of diode
- Transistor and it's uses

4.3 Nuclear physics:

- Laws of radioactive disintegration: half life, mean life, and decay constant.
- Stable and radioactive nuclei.
- Binding energy and mass defect
- Fission and fusion.

Engineering Physics Practical II:

[30]

1. Determine specific resistance of a wire.
2. Determine the frequency of A.C. mains.
3. Study current voltage characteristics of a junction diode.
4. Determine speed of sound by resonance air column method.
5. Determine Young Modulus.
6. Verify Ohm's law.
7. Determine force constant of a helical spring oscillation method.

8. Compare Emfs of two cells by using potentiometer.
9. Study characteristic curves of npn transistor.
10. Determine unknown resistance by Wheatstone bridge method.

Learning materials:

Text books:

1. Advanced level physics by Nelkon and Parker Vth and later editions
2. A textbook of physics, part I and part II by Gupta and Pradhan
3. Numerical problems in Engineering Physics for Diploma in Engineering I & II, Pankaj Sharma Ghimire & Krishna Shrestha, S.K. Books, Dhapasi, Kathmandu

Text book for laboratory work:

1. Physics Practical Guide by U.P. Shrestha, RPB

Other learning materials:

3. References to be selected by the related lecturer(s) from among the texts available in the market that meet the content needs of this subject
4. The related institute may develop its own textbook and approve from the related authority so as to have a prescribed textbook of this subject.

Engineering Chemistry II

EG 1203 SH

Year: I

Semester: II

Total: 6 hour /week

Lecture: 3 hours/week

Tutorial: 1 hours/week

Practical: hours/week

Lab: 2 hours/week

Course Description:

This subject consists of three units related to nonmetals and their compounds; metals and their compounds; and organic compounds and synthetic materials necessary to develop background in chemistry that supports for the understanding and practicing related engineering works.

Course Objectives:

After the completion of this subject, students will be able to explain the basic concepts related to the followings and apply them in the field of related engineering works:

1. Nonmetals and their compounds
2. Metals and their compounds
3. Organic compounds and synthetic materials

Course Content:

Unit: 1: Non-metals and their compounds:

[20]

1.1 Water:

- Source of water
- Hard and soft water
- Removal of temporary and permanent hardness of water
- Water treatment of domestic and industrial purpose

1.2 Ammonia:

- Lab preparation
- Manufacture by Haber's process
- Properties and uses

1.3 Nitric acid:

- Manufacture by Ostwald's process
 - Properties and uses.
 - Nitrogen cycle
 - Fixation of Nitrogen
 - Chemical fertilizers
 - Oxides of nitrogen as pollutant (general concept)
 - Acid rain (due to oxides of nitrogen and oxide of Sulphur "Sulphur dioxide")
- 1.4 Halogens (Chlorine):
- Lab preparation
 - Properties and uses
- 1.5 Hydrochloric acid:
- Lab preparation
 - Properties and uses
- 1.6 Hydrogen Sulphide:
- Lab preparation
 - Properties and uses
- 1.7 Sulphuric acid:
- Manufacture by contact process)
 - Properties and uses
- 1.8 Carbon and its compounds:
- Allotropes of carbon (reference of diamond & graphite & their structure).
 - Oxides of carbon (Ref. carbon dioxide & carbon mono oxide as pollutants)-
general idea only

Unit: 2: Metals and their compounds:

[15]

- 2.1 General study of metals and their components:
- Difference between metal and non metal
 - Combined & free state of metals
 - Chemistry of Metallic Carbonates, Sulphates, Chlorides and Nitrates
- 2.2 Alkali metals:
- General characteristics of Alkali metals
 - Properties & uses of sodium
- 2.3 Alkaline earth metals:
- General characteristics of the Alkaline earth metals
 - Properties & uses of calcium
- 2.4 Aluminum:
- Properties and uses
- 2.5 Coinage metals:

- General properties of coinage metals
 - Properties and uses of copper
- 2.6 Zinc:
- Properties & uses
- 2.7 Iron:
- Properties & uses
- 2.8 Lead:
- Properties & uses
- 2.9 Alloys:
- Definition
 - Purpose of making alloys
 - Types of alloys

Unit: 3: Organic compounds and synthetic materials:

[10]

3.1. Organic compounds

- Organic compounds:
 - Historical background, classification, and nomenclature
 - Functional groups and homologous series
- Saturated hydrocarbon: Properties of Methane
- Unsaturated hydrocarbon: Properties of Ethylene and Acetylene
- Aromatic compounds:
 - Definition
 - Comparison of aliphatic and aromatic compounds
 - Properties of Benzene

3.2. Synthetic materials:

- Polymer and polymerization
 - Definition
 - Types of polymer
- Rubber:
 - Types (Natural and Synthetic)
 - Preparation and uses.
- Polyvinyl chloride (PVC):
 - Preparation and uses
- Polythene:
 - Preparation and uses

Engineering Chemistry Practical II:

1. To compare the hardness of different types of water

[2]

2. To prepare Bakelite (resin) in the laboratory [2]
3. To determine the condition in which corrosion takes place [2]
4. To investigate the action of acids on some metals (Zn, Mg, Fe, Al, Sn & Cu) (acids: HCl, H₂SO₄(dil.)& HNO₃ (dil) [2]
5. To prepare and study the properties of hydrogen gas [2]
6. To prepare and study the properties of ammonia gas [2]
7. To prepare and study the properties of hydrogen Sulphide gas. (This gas should be prepared individually in woulf bottle but in Kipp's apparatus commonly) not [2]
8. To detect the acid radicals (Cl⁻, NO₃⁻, SO₄²⁻, CO₃²⁻) by dry and wet ways (4)
9. To detect the basic radicals (Cu⁺⁺, Al⁺⁺⁺, Fe⁺⁺⁺, Zn⁺⁺, CO⁺⁺, Ni⁺⁺, Ca⁺⁺, Ba⁺⁺, Mg⁺⁺)by wet ways [6]
10. To detect the acid and basic radicals (complete salt analysis) [6]

Textbooks:

1. Foundations of chemistry, Vol-2, M.K. Sthapit and R.R. Pradhananga
2. A text Book of chemistry, Jha & Guglani
3. A text Book of Organic Chemistry, B.S. Bahl & Arun Bahl
4. Elementary qualitative analysis, M.K.Sthapit and C.B.Tuladhar
5. Elementary practical chemistry, MK.Sthapit

Reference books:

1. Inorganic chemistry, Bahl & Tuli
2. Elementary Organic Chemistry, P.N. Bargava
3. Fundamentals of chemistry, K.R. Palak
4. A text Book of Inorganic Chemistry, L.M. Mitra
5. Engineering Chemistry, M.L. Sharma, K.M. Shrestha, P.N. Choudhary
6. A Text book of Engineering Chemistry, Prakash Poudel

Computer Applications

EG1206GE

Year: II
Semester: II

Total: 8 hours /week
Lecture: 2 hours/week
Practical: 5 hours/week
Tutorial: 1 hours/week

Course Description:

This course contains the basics of computer science covering history of computer science, basic computer architecture, data representation, fundamentals of programming and computer applications.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area

1. Basic Concepts of Computer Technology
2. Uses of Computer Technology
3. Fundamentals of Programming
4. Applications of Computer programme.

Course Contents:

- | | | |
|---------|--|---------|
| Unit 1. | Introduction to Computer Science | [3 hrs] |
| 1.1. | Features of Computer | |
| | <ul style="list-style-type: none">• Introduction to Computer• Features | |
| 1.2. | History of Computer Science | |
| | <ul style="list-style-type: none">• Overview• Different Inventions (Abacus, Napier Bone, Slide Rule, Pascaline, Difference Engine, Analytical Engine, Hollerinth's table)• Generations of Computer | |
| 1.3. | Application Fields of Computer | |
| 1.4. | Classification of Computers | |
| | <ul style="list-style-type: none">• Purpose (General and Specific)• Data Handling (Analog, Digital and Hybrid)• Functionality (Micro, Mini, Main Frame and Super Computers) | |
| Unit 2. | Basic Computer System | [2 hrs] |
| 2.1. | Overview | |
| 2.2. | Central Processing Unit | |
| | <ul style="list-style-type: none">• Arithmetic and Logic Unit• Control Unit | |
| 2.3. | Memory | |
| | <ul style="list-style-type: none">• Primary Memory• Secondary Memory• Cache | |
| 2.4. | Input and Output Devices | |
| | <ul style="list-style-type: none">• Basic Devices• Printers | |
| 2.5. | Hardware and Software | |

Unit 3.	Data Representation 3.1. Overview 3.2. Types • Integers • Real Numbers • Strings • Bits and Bytes 3.3. Fixed and floating point number representation 3.4. Computer Number System • Decimal Number System • Binary Number System • Octal Number System • Hexadecimal Number System • Conversion from one Number System to another • Binary Number Addition, Subtraction, Multiplication and Division	[5 hrs]
Unit 4.	Microsoft Windows and User Interface 5.1. Overview 5.2. Components (Desktop, Taskbar, Icons, My Computer, Start Button, Programs, Window Control Buttons, Menus and dialog boxes, File Management) 5.3. DOS(Disk Operating System) Overview	[3 hrs]
Unit 5.	Word Processor (Microsoft Office) 6.1. Overview 6.2. Starting MS-Word 6.3. Components of MS-Word Window 6.4. Navigating through a document 6.5. Editing Text 6.6. Clipboard 6.7. Formatting Text 6.8. Printing a document 6.9. Saving a file	[4 hrs]
Unit 6.	Spread Sheets (Microsoft Excel) 7.1. Overview 7.2. Starting MS-Excel 7.3. MS-Excel Toolbars 7.4. Creating a worksheet 7.5. Organizing data 7.6. Designing the worksheet 7.7. Working with formulas 7.8. Chart and Data Analysis 7.9. Printing worksheet	[6 hrs]
Unit 7.	Fundamentals of Programming 7.1. Overview 7.2. Program Development Cycle 7.3. Algorithm Development • Overview	[6 hrs]

- Rules
- 7.4. Flowcharts
 - Overview
 - Symbols
 - Rules
- 7.5. Pseudocode and its applications

Unit 8. **Security and Viruses** [3 hrs]

- 9.1. Overview
- 9.2. Hardware Security
- 9.3. Software Security
- 9.4. Computer viruses, types and their symptoms
- 9.5. Anti-Virus Software

Unit 9. **Internet and e-mail** [3 hrs]

- 10.1. Overview
- 10.2. Terms related to Internet
- 10.3. Basic Components required for Internet Connection
- 10.4. e-mail

Test and Revision

[10 hrs]

COMPUTER APPLICATION PRACTICAL / Total hours: 75

Course Contents:

Unit 10.	Computer Applications	[3 hrs]
1.1.	Demonstration of different type of computer applications	
Unit 11.	Basic Computer System	[3 hrs]
2.1.	Hardware Demonstration	
	<ul style="list-style-type: none">• Central Processing Unit• Memory and types of memory (Primary and Secondary memories)• Input and output devices• Printers	
Unit 12.	Data Representation - Exercise	[10 hrs]
3.1.	Decimal, Binary, Octal and Hexadecimal number system	
3.2.	Fixed and floating point number representation	
3.3.	Computer Number System	
	<ul style="list-style-type: none">• Decimal Number System• Binary Number System• Octal Number System• Hexadecimal Number System• Conversion from one Number System to another• Binary Number Addition, Subtraction, Multiplication and Division	
Unit 13.	Fundamentals of Programming - Exercise	[15 hrs]
4.1.	Algorithm Development	
4.2.	Flowcharts	
4.5.	Pseudocode	
Unit 14.	Microsoft Windows and User Interface	[10 hrs]
5.1.	Components (Desktop, Taskbar, Icons, My Computer, Start Button, Programs, Window Control Buttons, Menus and dialog boxes, File Management)	
5.3.	DOS(Disk Operating System)	
Unit 15.	Word Processor (Microsoft Office)	[10 hrs]
6.1.	Starting MS-Word	
6.2.	Components of MS-Word Window	
6.3.	Navigating through a document	
6.4.	Editing Text	
6.5.	Clipboard	
6.6.	Formatting Text	
6.7.	Printing a document	
6.8.	Saving a file	
Unit 16.	Spread Sheets (Microsoft Excel)	[15 hrs]
7.1.	Starting MS-Excel	
7.2.	MS-Excel Toolbars	
7.3.	Creating a worksheet	
7.4.	Organizing data	
7.5.	Designing the worksheet	

7.6.	Working with formulas	
7.7.	Chart and Data Analysis	
7.8.	Printing worksheet	
Unit 17.	Security and Viruses	[2 hrs]
9.1.	Computer viruses, types and their symptoms	
9.2.	Anti-Virus Software	
Unit 18.	Internet and e-mail	[2 hrs]
10.1.	Internet	
10.2.	Internet Connection	
10.3.	e-mail	
Test and Revision		[5hrs]

Reference Books

1. *Introduction to Computer Science, Pearson Publication*
2. *A First Course in Computers, Sanjay Saxena, Vikash Printing House Pvt. Ltd, India*
3. *Manual for MASTERS IN COMPUTER APPLICATIONS, Hemanta Baral*

Survey Instruments II EG 1207 GE

Year: I
Semester: II

Total: 12 hrs/week
Lecture: hrs/week
Tutorial: 2 hrs/week
Practical: 10 hrs/week

Course Description:

This part of the course deals with Direction measuring instrument- THEODOLITE, Subtense Bar measurement of Distance, Heighting Instruments, EDM and Total Station

Course Objectives:

After the completion of this course, the students will

- be acquainted with and be able to explain the requirement of Horizontal and Vertical/ Zenithal angles in surveying
- be able to operate various kinds of Theodolites for angle measurements
- be able to use Subtense method of distance measurements on the earth's surface
- be acquainted with and be able to explain the use of Electronic Distance Meters and Total Stations
- be able to use various instruments- LEVELS for differentiating heights on the earth's surface

Course Guidelines

The students shall be required to carry out the following tasks for each instrument / equipment listed in the course content:

1. Practice with the instrument in the field
2. Prepare drawing/s related with the instrument/equipment in the form of neat labelled diagram/s
3. Prepare practical sheets document containing
Relevant drawing/s, Description, Components, Types, Accessories, Principle, Adjustments, Functions and Use, Care, Operational/Field procedure and observation record, and relevant solution of practical/numerical problems

Course Contents:

Unit 1:	Direction Measuring Instrument- Theodolites	(25 hrs +35 hrs)
	1.1 Theodolite and accessories	
	1.2 Micrometer Optical Theodolite	
	1.3 Digital/Electronic Theodolite	
Unit 2:	Distance Measuring Instruments	(25 hrs +25 hrs)
	2.1 Theodolites and Staff	
	2.2 Theodolite and Subtense Bar	
	2.3 Electronic Distance Meters (EDM)	
Unit 3:	Total Station	(4 hrs+6hrs)
Unit 4:	Heighting Instruments	(25 hrs +35 hrs)

- 4.1 Hydrostatic Level
- 4.2 Simple spirit level
- 4.3 Abney Level
- 4.4 Altimeter
- 4.5 Levelling instruments and accessories
 - Dumpy Level
 - Tilting Level
 - Automatic Level
 - Digital/Electronic Level

Reference Books

1. *Surveying Vol. I Dr. B.C Punmia, Laxmi Publication Pvt.Ltd*
2. *Surveying Vol. I S.K. Duggal, Tata McGraw- Hill Publishing Company Ltd. New Delhi*
3. *Principles and use of Surveying Instruments, J. Clendinning, J.G Oliver*

Second Year

(Semester II & III)

Third Semester

EG2101SH	Applied Mathematics & Statistics
EG2102GE	Fundamental of Surveying
EG2103GE	Control Surveying I
EG2104GE	Cartography
EG2105GE	Survey Drawing II

**Diploma in Geomatics Engineering
Curriculum Structure- Second Year/ First Part**

Year: II

Part: I

Teaching Schedule			Mode					DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Lab	Total Hours	Theory			Practical				
								Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG2101SH	Applied Mathematics	3	1			4	20	80	3				100	
2	EG2102GE	Fundamental of Surveying	3	1	6		10	20	80	3	60	40	3	200	
3	EG2103GE	Control Surveying I	3	1	8		12	20	80	3	60	40	3	200	
4	EG2104GE	Cartography	3	1	4		8	20	80	3	30	20	2	150	
5	EG2105GE	Survey Drawing II				6	6				60	40	3	100	
Total			12	4	18	6	40	90	360		180	120		750	

Applied Mathematics

EG2101GE

Year: II
Semester: III

Total: 4 hour /week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical : 0 hours/week
Lab : 0 hours/week

Course Description:

This course covers the application of mathematics in the area of surveying and mapping. This includes fundamental of group theory, application of derivatives, differential equations and numerical methods.

Course objectives

On completion of this course students will be able to

- Discuss group as algebraic structure and establish simple results on finite and infinite groups.
- Derive equation of parabola ellipse and hyperbola and find tangent and normal to the parabola.
- Define differential equations and different forms of solutions and use in application.
- Determine a root equations by numerical methods and
- Evaluate integrals by trapezoid and Simpson's rules.

Course contents

Unit -1 Elementary group theory 10 hrs

- Binary operation ,
- Binary operation on sets of integers and their properties,
- Definition of a group
- Groups whose elements are not numbers ,
- Uniqueness of identity, uniqueness of inverse ,
- cancellation law ,
- Abelian group.

Unit -2 Application of derivatives 5 hrs

- L-Hospital rule (for $0/0$, ∞/∞),
- Differentials, tangent and normal ,
- Geometric interpretation and application of Roll's theorem and Mean value theorem.

Unit -3 Differential equation**5 hrs**

- Differential equation and its order and degree,
- Differential equations of first order and first degree,
- Differential equations with separable variables,
- Homogeneous and exact differential equations

Unit – 4 Computational Method**10 hrs**

- Introduction to numerical computing
- Number System
- Basic Arithmetic of Various number system
- Approximation Errors in Numerical methods
- Measurement of errors

Unit -5 Numerical Integration**10hrs**

- Definite Integral and Area Computation
- Introduction
- Trapezodal Rule
- Estimation of Errors
- Simpson's rules
- Eestimation of errors

Test and Revision**5 hrs****Reference books**

1. Higher Secondary Level Mathematics Vol II by Bajrachara B.C. RM Shrestha et.al, Sukunda Pustak Bhawan
2. Element of mathematics Part II, D.B Adhikari and et.al, Himalaya Books Stall

Fundamental of Surveying **EG 2102 GE**

Year: I
Semester: II

Total: 10 hrs/week
Lecture: 3 hrs/week
Tutorial: 1 hrs/week
Practical : 6 hrs/week

Course Description:

This part of the course is intended to give an introduction to the History of surveying, basic Surveying concepts and principles, different Types of surveying, Linear and Angular Measurements, Map reading, and Measurement Errors.

Course Objectives:

Upon completion of this course, the students will

- have a good understanding of basic surveying concepts
- be able to apply the principles of surveying in surveying projects
- be well acquainted with Linear and Angular measurements and skilled in utilizing different techniques of linear and angular measurements
- be prepared to carry out surveying works to the required level of accuracy
- have acquired an skill of Map Reading

Course Contents:

Unit 1:	Historical background	2 hrs
	1.1 Brief history of Surveying	
	1.2 Development of Surveying and Mapping Science	
	1.3 Surveying and Mapping in Nepal	
Unit 2:	Introduction to Surveying	8 hrs
	2.1 Surveying and Mapping, Geomatics	
	2.2 Functions of a Surveyor	
	2.3 Need importance and scope of surveying	
	2.4 Objectives of surveying	
	2.5 General procedure of Survey and Methods used	
	2.6 Surveying Concepts:	
	• Distance and Direction;	
	• Geodesy;	
	• Shape and size of the earth;	
	• Curvature of earth;	
	• Spheroid and Geoid;	
	• Earth figure elements- Axis of earth, Great Circle, Equator, Parallels and Meridians, Flattening;	
	• Coordinates and Coordinates systems;	
	• Latitude, Longitude, Height above MSL, Normal;	
	• Geodetic Tables;	
	• Projection;	
	• Relief representation	

	2.7	End products of surveying	
Unit 3:		Principles and Classifications	2 hrs
	3.1	Basic Principles of surveying	
	3.2	Classification of Surveys: basis of classification and types of surveys	
Unit 4:		Measurement Units	3 hrs
	4.1	Significance of measurement units	
	4.2	Standardization of Units	
	4.3	Linear, Angular, Surface and Volume units	
	4.4	Conversion of units	
Unit 5:		Map Scale	5 hrs
	5.1	Introduction	
	5.2	Expression of map scale and Types of scale	
	5.3	Construction of Graphical scale	
	5.4	Scale and graphical error	
	5.5	Shrunk scale and shrinkage factor,	
	5.6	Importance and uses of map scale	
Unit 6:		Linear Measurements	10 hrs
	6.1	Introduction and Principles	
	6.2	Slope, Horizontal and Vertical distances	
	6.3	Distance measuring instruments	
	6.4	Ranging, Chaining and Obstacles in chaining	
	6.5	Errors in Chaining	
	6.6	Linear surveying (Chain surveying)	
	6.7	Optical Distance Measurement	
	6.8	Electronic Distance Measurement	
Unit 7:		Angular Measurements	10 hrs
	7.1	Principle of direction measurement	
	7.2	Angles and Bearings	
	7.3	Compass Survey: Fieldwork procedure and plotting	
	7.4	Horizontal and Vertical angles	
	7.5	Theodolites Survey	
	7.6	Field procedures for angular measurement by Theodolite	
	7.7	Errors and Adjustments in Theodolite observations	
Unit 8:		Map Reading	4hrs
	8.1	Introduction: Maps, Plans and Profiles, Different types of maps	
	8.2	Maps and Photographs	
	8.3	Map Reading: Map components, Map information, Map setting, Position finding, Map interpretation,	
Unit 9:		Measurement Errors	6 hrs
	9.1	Introduction	
	9.2	Significant figures	
	9.3	Sources of errors	
	9.4	Types of Errors	

- 9.5 Precision and Accuracy
- 9.6 Propagation of Errors
- 9.7 Errors: Precautions and Adjustments

Revision and Tests

10hrs

Reference Books

1. *Fundamental of Surveying by S.K Roy*
2. *प्रारम्भिक नापी महेश्वर भट्टराई (त्रि.वि.वि./पा.वि.के)*
3. *Principles and use of Surveying Instruments, J. Clendinning, J.G Oliver*
4. *Introduction to Surveying, by Anderson & Mikhail*
5. *A Text Book of Advance Surveying, R. Agor (4th Edition)*
6. *Surveying Handbook – Brinker and Minnick. CBS Publication of India*

FUNDAMENTAL OF SURVEYING PRACTICAL

Unit 1: Chain survey (Field work and Plotting)	20hrs
Unit 2: Compass Survey (Field work and Plotting)	20hrs
Unit 3: Measurement of angles using Theodolites by different methods	20hrs
Unit 4: Map Reading	15hrs
Unit 5: Map coordinates exercises	15hrs

Control Surveying I

EG 2103 GE

Year: II
Semester: I

Total: 11 hrs/week
Lecture: 2 hrs/week
Tutorial: 1 hrs/week
Practical: 8 hrs/week

Course Description:

This subject deals with methods of establishing horizontal and vertical controls, Theodolite Traversing and Levelling, which are mostly used in geodetic as well as engineering survey works.

Course Objectives:

After the completion of this course, students will be able to

1. Explain the concepts of the control surveying and apply in the field of Surveying and mapping
2. Understand and use different types of levelling techniques for establishing vertical control points and heighting
3. Understand and use theodolite traversing techniques for establishing horizontal control points
4. Understand different sources of error and their adjustment in leveling and traversing.

Course Contents:

Unit 1: Levelling

- | | | |
|------------|--|---------------|
| 1.1 | Introduction | 4hrs |
| | <ul style="list-style-type: none">• Introduction & Principle of leveling• Definitions of terms: Level, Levelling, level surface, level line, datum, MSL, RL, BM (PBM & TBM), HI, BS, FS, IS, Turning point, Horizontal plane, Horizontal line, Elevation, Altitude, Vertical plane, Vertical line• Principles of levelling• Levelling instruments and accessories | |
| 1.2 | Methods of Levelling | 6 hrs |
| | <ul style="list-style-type: none">• Classification of levelling: Spirit, barometric, hydrostatic, trigonometric, hypsometric, GPS• Methods of leveling: Simple Levelling, Differential Levelling, Check Levelling, Fly Levelling, Reciprocal Levelling, Precise Levelling, Profile Levelling, Cross Sectioning | |
| 1.3 | Field Procedure | 10 hrs |
| | <ul style="list-style-type: none">• Testing levels and Checking collimation error,• Reconnaissance, Monumentation,• Observation• Recording• Computation• Precautions to be taken in the field | |

1.4	Errors and adjustment in Levelling	5 hrs
	<ul style="list-style-type: none"> • Types of error • Sources of error • Permissible error in different order of levelling • Adjustment 	
Unit 2: Traverse		
2.1	Introduction	4 hrs
	<ul style="list-style-type: none"> • Introduction to Traverse, • Definition of terms • Principles of traversing • Different orders of traverse and their use 	
2.2	Method of traversing	6 hrs
	<ul style="list-style-type: none"> • 2.2.1 Chain Traverse, • 2.2.2 Compass Traverse, • PT Traverse, • Stadia Traverse and Theodolite Traverse • Traverse Route: Open and Closed 	
2.3	Field procedure	10 hrs
	<ul style="list-style-type: none"> • Field operation: Reconnaissance , Monumentation, and Signaling, Selection of Traverse Station, Types of Monumentation, Construction of monument, D-Cards, Traverse Chart/ Sketch • Angle measurement: Horizontal angles, zenithal/vertical angle, bearing computation • Distance Measurements: Distance Measurement by Tapes, Subtense Bar, Stadia Method, and E.D.M, • Recording, 	
2.4	Error and Adjustment in Traverse	5 hrs
	<ul style="list-style-type: none"> • Types of error • Sources of error • Standard and Specification • Traverse Adjustment by Bowditch, Transit, Graphical, • Precaution to be taken in field 	
Unit 3: Revision and Test		
		10 hrs

Reference Books

1. *Surveying (Volume 1 and 2) by Dr. K.R. Arora: Rajons Publication Pvt. Ltd.*
2. *Surveying (Volume 1 and 2) by Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain: Laxmi Publication (P) Ltd.*
3. *The Text book of Surveying & Levelling, by R. Agor*
4. *Levelling Instruction Book, Survey Department of Nepal*
5. *Tringulation Instruction Book, Survey Department of Nepal*

Control Surveying I - Practical

LEVELLING PRACTICAL

Field work

Unit 1: Collimation Checking	5 hrs
Unit 2: Reconnaissance and Benchmark Establishment	5 hrs
Unit 3: Levelling field work (Different methods)	35 hrs

Indoor work

Unit 4: Computation and plotting of profiles	5hrs+10 hrs
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TRAVERSE SURVEY

Field work

Unit 1: Instrument Checking	5 hrs
Unit 2: Reconnaissance and Monumentation	5 hrs
Unit 3: Theodolite/total station Traverse (open and closed loop)	35 hrs
Unit 4: Graphical Plotting and adjustment	5hrs+10 hrs

Cartography

EG 2104 GE

Year: II
Semester: I

Total: 8 hrs/week
Lecture: 3 hrs/week
Tutorial: 1 hrs/week
Practical : 4 hrs/week

Course Description:

This subject consists of fundamental principles and techniques of map making and map reproduction.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area

1. Concept of Cartography
2. Principle of Cartography
3. Different methods of map making
4. Map reproduction

Course Contents:

Unit 1	Introduction 1.1. Definition 1.2. Scope and uses of Cartography	[4hrs]
Unit 2	Map 2.1. Definition 2.2. Types of Map 2.3. Uses of Map 2.4. Map Scale 2.5. Enlargement and Reduction of Map Scale 2.6. Map Design and Layout 2.7. Name Placement 2.8. Symbol used in maps	[6hrs]
Unit 3.	Components of of Cartography 3.1. Map Compilation <ul style="list-style-type: none">• Base Map, Derived map and Special Purpose (Thematic) Map• Steps of Map Compilation 3.2. Map Reproduction <ul style="list-style-type: none">• Desktop Cartography• Contact Photography• Camera Photography• Plate Making Process (Positive and Negative System)/ Digital Methods• Quality Control (Colour Proof and Maintenance of Register)• Map Printing	[10hrs]

Unit 4.	Graphic Variables	[3hrs]
	4.1. Definition	
	4.2. Importance of Graphic Variables	
	4.3. Types of Graphic Variables	
Unit 5.	Map Projection	[7hrs]
	5.1. Introduction	
	5.2. Classification of Map Projection	
	5.3. Choice of Map Projection	
	5.4. Universal Transverse Mercator (UTM) Projection	
	5.5. Projection System used in Nepal	
Unit 6.	Map Sheet Numbering	[6hrs]
	6.1. Introduction	
	6.2. Map Sheet Numbering for Topographic Maps in Nepal	
	6.3. Map Sheet Numbering for Cadastral Maps in Nepal	
Unit 7.	Generalization	[4hrs]
	7.1. Definition	
	7.2. Different Methods of Generalization	
Unit 8.	Relief Representation	[6hrs]
	8.1. Definition of Relief	
	8.2. Importance of Relief Representation in Maps	
	8.3. Methods of Relief Representation	
	<ul style="list-style-type: none"> • Spot Height • Contouring • Hill Shading • Layer Tinting • Rock Drawing 	
Unit 9.	Colour	[3hrs]
	9.1. Introduction	
	9.2. Nature of light	
	9.3. Additive and Subtractive Colours	
	9.4. Colour Triangle	
	9.5. Choice of Colours	
Unit 10.	Digital Cartography	[6hrs]
	10.1. Introduction	
	10.2. Raster and Vector Data	
	10.3. Differences between Digital and Conventional Cartography	
	10.4. Introduction to Digital Landscape Model (DLM) and Digital Cartographic Model (DCM)	
Unit 11.	Revision and Test/Exam	[5hrs]

Reference Books

1. *Elements of Cartography, H. Rabison*
2. *Cartography for Mapping, Rabin Kaji Sharma*
3. *Cartography Visualization of Geospatial Data, Menno Kraak & Ferhan Ormeling*
4. *Basic Cartography Vol I, International Cartographic Association*
5. *Lecture Notes*

Cartography – Practical

1. Prepare Layout in A4 size Paper for Cadastral Map Sheet [4 hrs]
2. Prepare Layout in A4 size Paper for Topographic Map Sheet [4 hrs]
3. Trace a fragment (2' 30" X 2' 30") of different details of Topographic Map of Scale 1: 25000 [10 hrs]
4. Identify and List the different Visual Variables in the Topographic Map of Nepal [2hrs]
5. Show the Sheet Numbering System of Topographic Map of Nepal [4 hrs]
6. Show the Sheet Numbering System of Cadastral Map of Nepal [8 hrs]
7. Generalize the boundary of given District/VDC Polygon [4 hrs]
8. Generate (manually) contour lines from the given spot heights [6 hrs]
9. Prepare a Location Map of a given location [4 hrs]
10. Prepare Colour Separation Sheets (2' 30" X 2' 30" Topographic Map; Four Colours) for Plate Making [8 hrs]
11. Map Reproduction and Printing Process: Observation of Map Printing Press [6 hrs]

Survey Drawing II

EG 2105 GE

Year: II
Semester: I

Total: 8 hrs/week
Lecture: hrs/week
Tutorial: 1 hrs/week
Practical : 7 hrs/week

Course Description: This part of the course deals with engineering drawing and Auto CAD Applications.

Course Objectives:

After the completion of this course, students will be able to

1. Draw simple geometrical figures,
2. Draw sketches of an area visited,
3. Interpret Simple Engineering drawing
4. Use Autocad tools for plotting of measurements.

Course Contents:

Unit 1:	Projection	[4hrs]
	3.1 Introduction	
	3.2 Isometric Projection	
	3.3 Orthographic Projection	
	Practical:	
	1 Construct an Orthographic Projection of given Solid Figure	[8hrs]
Unit 2:	Profile	[4hrs]
	4.1 Introduction	
	4.2 Definition of Cross-section and longitudinal-section	
	4.3 Importance of Cross-section and Longitudinal-section in Surveying and Mapping	
	Practical:	
	1 Draw Profiles from the given data	[8hrs]
Unit: 3	Engineering Drawing	[6hrs]
	3.1 Introduction to Engineering Drawing	
	3.2 Section views and Dimensioning	
	3.3 Intersections	
	Practical	[24hrs]
	1. Intersections of	
	- Line and Plane	
	- Plane and Plane	
	- Line and solid figure	

- Plane and solid figure
- 2. Section views in orthographic projection datum. Dimensioning
- 3. Engineering drawing Interpretation

Unit 4:	Computer Aided Design (CAD) – (Working Theory and Practical)	[48hrs]
4.1	Introduction	[3hrs]
4.2	Drawing objects - lines, polygons, circles, points and multi-lines.	[3hrs]
4.3	Object Selection- Picking, selection sets, options and settings	[3hrs]
4.4	Modifying objects - Detailed description of all modify commands	[3hrs]
4.5	Units and Scale- Drawing scales units and unit control	[3hrs]
4.6	Drawing Aids- Use of various function keys (F1 to F10)	[3hrs]
4.7	Object Properties - layers, colors and line types	[3hrs]
4.8	Object snaps	[3hrs]
4.9	Dimensioning	[3hrs]
4.10	Hatching as per scale	[3hrs]
4.11	Text and its use in Auto CAD	[3hrs]
4.12	Project Work (Auto CAD Application)	[15hrs]

Revision and Test **[18hrs]**

Reference Book

1. *Fundamental of Engineering Drawing, Warven J. Cauzadder (2001)*
2. *Engineering Drawing Volume I and II by K.R. Gopalkrishna*
3. *Engineering Drawing and AutoCAD, K. Venugopal (2001)*
4. *Engineering Drawing and Graphics and Auto CAD, K. Venugopal (4th Edition 2001)*
5. *Elements of Cartography, H. Robison*

Semester IV

EG2201GE	Control Surveying II
EG2202GE	Topographical Survey
EG2203GE	GIS Basics
EG2204ES	Earth Science & Environment
EG2205GE	Survey Computation and Adjustment

Diploma in Geomatics Engineering Curriculum Structure- Second Year/ Second Part

Year: II

Part: II

Teaching Schedule			Mode					DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Lab	Total Hours	Theory			Practical				
								Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG2201GE	Control Surveying II	2	1	6		9	10	40	1.5	60	40		150	
2	EG2202GE	Topographical Survey	3	1	6		10	20	80	3	60	40		200	
3	EG2203GE	GIS Basics	3	1		4	8	20	80	3	60	40		200	
4	EG2204ES	Earth Science & Environment	2	1	3		6	10	40	1.5	30	20		100	
5	EG2205GE	Survey Computation and Adjustment	2	1	4		7	10	40	1.5	30	20		100	
Total			12	5	19	4	40	70	280		240	160		750	

Control Surveying II

EG 2103 GE

Year: II
Semester: II

Total: 9 hrs/week
Lecture: 2 hrs/week
Tutorial: 1 hrs/week
Practical : 6 hrs/week

Course Description:

This subject deals with methods of establishing horizontal and vertical controls, Triangulation, Trilateration, Theodolite Resection and Intersection which are the fundamental techniques to establish and densification of control points in geodetic as well as engineering survey works.

Course Objectives:

After the completion of this course, students will be able to

1. Explain the concepts of the control surveying and apply in the field of Surveying and Geomatics.
2. Establish Triangulation network
3. Use trilateration methods for establishing horizontal controls
4. Distinguish among different technique of establishing control points.

Course Contents:

Unit 1:	Triangulation	20 hrs
1.1	Introduction <ul style="list-style-type: none">● Definition● Purpose● Scope● Classification of Triangulation Network● Different Orders of Triangulation and their Specifications● Types of Figure● Strength of Figure● Types of Control Points	
1.2	Reconnaissance and Monumentation <ul style="list-style-type: none">● Introduction● Planning of Network and Control Points● Layout of Network on Map● Intervisibility Calculation● Selection of Station● Chart Preparation● Types of Monumentation● Construction and Design of Monuments● Description Card● Care and Maintenance of Monuments	
1.3	Signals used in Triangulation: <ul style="list-style-type: none">● Different Types of Signals	

	<ul style="list-style-type: none"> ● Choice of Signals ● Observation Tower ● Method of erecting Signals ● Care and Maintenance of Signals 	
1.4	Field observation and recording: <ul style="list-style-type: none"> ● Observation of Horizontal and Zenithal/ Vertical Angles ● Distance Measurements ● Recording the observation ● Joint Observations ● Satellite stations ● Field check ● Reduced means ● Triangular Misclosure ● Satellite Stations 	
1.5	Computation and adjustment <ul style="list-style-type: none"> ● Compilation of Forms and Tables ● Different Formulae used for Computation ● Computation of Difference of Easting and Northing ● Adjustment of Triangulation Network ● Difference in Height by Vertical Angles ● Height Misclosure and Correction ● Height of Station ● Types and Sources of error ● Standard and specification ● Error adjustment and Accuracy Assessment 	
Unit 2:	Trilateration:	5 hrs
	2.1 Introduction	
	2.2 Definition and Principles	
	2.3 Purpose and Scope	
	2.4 Method of Trilateration	
	2.5 Instruments to be used	
	2.6 Observation Method	
	2.7 Field Book	
	2.8 Computation and Adjustment	
	2.9 Comparison of Triangulation and Trilateration	
	2.10 Advantages and Disadvantages	
Unit 3:	Theodolite Resection and Intersection:	5hrs
	3.1 Introduction	
	3.2 Definition and Principles	
	3.3 Purpose and scope	
	3.4 Method of Observation	
	3.5 Recording	
	3.6 Computation and Adjustment	
	3.7 Precautions to be taken	
	3.8 Advantages and Disadvantages	
Unit 4:	Revision and Test	15 hrs

Control Survey II Practical

Field work

Unit 1:	Triangulation field work	60hrs
	1.2 Instrument Checking	
	1.3 Reconnaissance and Monumentation	
	1.4 Field procedure	
Unit 2:	Trilateration	15hrs
Unit 3:	Intersection and Resection	15hrs

Reference Books:

1. *Surveying (Volume 1, 2 and 3) by Dr. K.R. Arora: Rajons Publication Pvt. Ltd.*
2. *Surveying (Volume 1, 2 and 3) by Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain: Laxmi Publication (P) Ltd.*
3. *Surveying Vol I and II, S.K DUGGAL*
4. *जमीन सर्वेक्षण, तीर्थ बहादुर प्रधानाङ्ग*

Topographical Survey

EG 2202 GE

Year: II
Semester: II

Total: 10 hrs/week
Lecture: 3 hrs/week
Tutorial: 1 hrs/week
Practical: 6 hrs/week

Course Description:

This subject consists of **six** units related to topographical surveying background including graphical and numerical methods helpful for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to explain the basic concepts, principles and methods of topographical surveying both graphically and numerically and apply them in the field of related engineering area.

Course Contents:

- Unit 1: Introduction** [5 hrs]
- 1.1. Introduce Topographical Surveying and define the following:
 - Planimetric and altimetric detail
 - Artificial and natural features
 - 1.2. Methods of Topographical Surveying: Brief Introduction
 - Ground Survey Method
 - Photogrammetric survey Methods
- Unit 2: Process of Plane Table (PT) Surveying** [15 hrs]
- 2.1. Explain the following accessories of Plane Table Survey:
 - Plane Table
 - Alidade: Simple Alidade and Telescopic Alidade
 - Plumb bob
 - Magnetic Compass
 - Clinometer
 - Checking and adjustment of equipment
 - Preparation of Plane Table Sheet
 - 2.2. Define Control net for PT survey and auxiliary points
 - 2.3. Explain the following steps for Setting up for Plane Table Survey
 - Stabilization
 - Centering
 - Leveling
 - Orientation
 - 2.4. Explain the following Methods of Plane Tabling
 - Radiation
 - Intersection
 - Traversing
 - Resection: Two point problem and Three point problem
 - 2.5. Define Danger Circle
 - 2.6. Explain the following steps of Field work for Surveying details
 - Preparation

- Reconnaissance
 - Picking details
 - Accessory works
- 2.7. Identify Errors in plane tabling
- 2.8. Identify Advantages and disadvantages of Plane tabling

Unit 3: Numerical Surveying **[10 hrs]**

- 3.1 Introduce Numerical Surveying
- 3.2 Explain Principle of Numerical Survey
- 3.3 Explain the Methods
- 3.4 Identify the Uses
- 3.5 Describe in short the following Instruments and accessories used for Numerical survey:
- Tape,
 - Theodolite,
 - EDM,
 - Total Station and
 - GPS

Unit 4 : Operations of Numerical Survey **[15 hrs]**

- 4.1 Explain the following steps of Numerical Survey
- Preparation for Numerical Surveying
 - Checking and adjustment of equipment
 - Reconnaissance of area specified for survey
 - Diagram of control network
 - Observation
 - Computation and adjustment of data
 - Plotting and drawing

Unit 5: Define Contour survey **[5 hrs]**

- 5.1 Define contour line and contour interval
- 5.2 Describe Characteristics of contour
- 5.3 Explain the Methods of Contouring

Revision and Test: **[10 hrs]**

Reference Books

1. *The Principles of Surveying, J. Clendinning and J.G. Olliver, The English Language Book Society (ELBS)*
2. *A Text Book of Surveying C. Venkatramaiah, University Press (India) Limited*
3. *Fundamental of Surveying S.K Roy, Prentice hall of India*
4. *Plane Surveying, David Clark*

TOPOGRAPHICAL SURVEYING PRACTICAL

Unit 1:	Establishment of Controls for Plane Table	[10 hrs]
Unit 2:	Plane Table Traverse Survey and adjustment	[10 hrs]
Unit: 3	Large Scale Topographical Mapping by Plane Table Survey in the scale of 1:1000 / 1:500	[15 hrs]
Unit: 4	Map Compilation	[05 hrs]
Unit 5.	Planning for Numerical Surveying	[10 hrs]
	5.1 Preparation for field work and arrangement of necessary equipment	
	5.2 Organization of field data	
	5.3 Calculation and adjustment	
	5.4 Plotting and drawing	
	5.5 Exercise for calculation of area based on numerical data	
Unit 6.	Carry out following steps of Numerical Survey in the Field	[35 hrs]
	6.1 Reconnaissance	
	6.2 Observation/Data Capture for Topographical/Cadastral/Engineering Mapping (1:500)	
Unit 7.	Revision and Test	[05 hrs]

Geographic Information System (GIS) Basics EG2203GE

Year: II	Total: 8 hrs/week
Semester: II	Lecture: 3 hrs/week
	Tutorial: 1 hrs/week
	Practical : 4 hrs/week

Course Description:

The primary objective of this course is to impart fundamental concepts of Database Management system and Geographical Information System. This course aims to introduce various applications of GIS and related technologies in Survey Engineering field. The course focuses on practical approach in learning database and GIS concepts.

Course Objectives:

After the completion of this course, students will be able to:

- 1 understand database management system and design simple databases
- 2 understand the basic concept of GIS and its applications in various fields
- 3 operate GIS software for simple applications
- 4 perform simple GIS operation and preparing data for GIS applications
- 5 query the databases
- 6 compose maps

Course Contents:

Unit 1: Database Management System [10 hrs]

1.1 Introduction to Database Management System

- Define term Data and information
- Define Databases and databases management system (DBMS)
- Explain the component of database management system
- Define: tables, form, Query, relationship, reports

1.2 Logical Data concept and Relationships

- Introduce logical data concept :entities, data value, field/ attribute, records and relationships
- Explain the types of relationships (one to one, one to many, many to many)
- Define database tables and explain field data types
- Explain key field (primary key, candidate key and foreign key)

1.3 Data models and DBMS applications

- Introduce different types of Relational Data Model
- Define object oriented data model
- Introduce database language: Data definition language (DDL), Data Manipulation Language (DML)
- Introduce physical and conceptual data models
- Introduce database modeling process
- Explain the process of creating a database tables
- Query relational databases

- Explain database administration
- Explain the need and applications of Database Management System (DBMS)

Unit: 2 GIS and Spatial Data Models [10 hrs]

2.1. Introductions to GIS

- Define GIS
- Introduce Component of GIS
- Introduce different stages of GIS workflow (Data Acquisition, Data storage & Management, Data Analysis, and Visualization)
- Define the terms: spatial and non-spatial data, features, attribute tables.
- Explain GIS applications & Users

2.2. Spatial Data Models

- **Vector Data Model**
 - Define Vector Data Models
 - Define Scale
 - Make familiar with file format of vector data
 - Introduce Geometry types of vector data (point, Line & Polygon)
 - Explain the applications of vector data models
 - Understand advantages and disadvantages of the use of Vector data model
- **Raster data Model**
 - Define Raster Data Models
 - Define resolution of raster dataset
 - Make familiar with file format of Raster data
 - Introduce the raster data structure (Grid Cells)
 - Explain the applications of vector data models
 - Understand advantages and disadvantages of the use of Vector data model
- **TIN Data Models**
 - Define TIN data models
 - Data Structure of TIN model
 - Explain the applications of TIN data model

Unit: 3 Spatial Data Acquisition and Preparation [10 hrs]

3.1 Sources of Spatial Data

a. Primary Data Sources

- Ground surveying, GPS and DGPS
- Photogrammetry
- Remote sensing

b. Secondary Data Sources

- Existing paper maps
- Clearinghouse and online sources
-

3.2 Data Entry and Data Preparation

- Define map scanning process & Scanning Resolution
- Define Geo-referencing and map projection
- Introduce digitization process

- Define attribute information
- Create attribute data of digitized features
- Checking and repairing Geometry of spatial data
- Define topology
- Understanding the topological rules and the process for generating topology

Unit: 4 GIS Operations and Map composition [10 hrs]

4.1 Querying Databases

- Define querying database
- Understand structure of query language (SQL)
- Define and explain The terms: attribute query, Spatial query
- Differentiate Spatial and database query

4.2 Overlay Operation and Geo-processing

- Define and explain following overlay operation with examples
 - Clipping
 - Intersection
 - Union
 - Merge
 - Dissolve

4.3 Map composition

- Define maps as output of GIS
- Explain steps of map composition in GIS environment
- Understand Map lay out and map elements
- Understanding use of color and symbols in maps

Unit 5: Test and Revision [20 hours]

Geographic Information System (GIS) Basics

Practical:

- Unit: 1 Database management System [10 hrs]**
- 1.1 Working with Existing databases
- Explore Existing Databases
 - Understand the information stored in existing database
 - Understand relationships
 - Querying existing database (simple query)
 - Querying database using logical operators
 - Generate reports
- 1.2 Database Design
- Draw database schema
 - Design database tables (design view, Datasheet views),
 - Establish relationships among database tables
 - Querying database
- Unit 2: Exploring spatial data and data preparation [10 hrs]**
- 2.1 Exploring Spatial Data using GIS software
- Introduce GIS software used
 - Add data Layers
 - View Layer Properties
 - Off/On/ remove data layers
 - View and understand attribute table
 - Change Symbolology & Color
 - Label features
 - Navigate digital maps (Zoom In/Zoom out, Fixed Zoom in/ Fixed Zoom out, Panning)
 - Import external point data into GIS environment
- 2.2 Geo-referencing & Map Projection
- Geo-reference scanned maps/ images
 - Define and Setting out map projection (Nepalese map projection system)
 - Transform maps in different coordinate system
- Unit: 3 Creating data layers and table operation [10 hrs]**
- 3.1 Working with arc-Catalogue
- Explore data in Arc-Catalogue
 - View meta data and data information in arc catalogue
 - Create Vector layers (point, line polygon)
- 3.2 Table Operations
- view Table statistics
 - Relate and join tables
 - Add/ remove fields
 - Use of field calculator /Field Calculation
 - Summarize Attribute table
 - Calculate Geometry (Area, Length, and position)
 - Export tables
- 3.3 Digitization

- Digitize raster map
 - Add Attribute information
- Unit: 4 Query and Overlay Operation [10 hrs]**
- 4.1 Querying Databases
- Perform Attribute query
 - Select by location (spatial query)
- 4.2 Overlay Operation
- Perform following Overlay operation
 - Clip
 - Intersection
 - Union
 - Merge
 - Generate Buffer
- Unit: 5 Visualization [10 hrs]**
- 5.1 Map composition and map printing
- Compose map
 - Export maps indifferent formats
 - Print maps
- Test and Revision [10 hrs]**

References:

1. *An Introduction to Geographical Information System*
- Ian Heywood, Sarah Cornelius, Steve Carver, Pearson Education
Publication: Pearson Education (Fourth Edition) 2005
2. *Principles of Geographic Information System*
- Rolf A. de By (ed.) (ITC Education Text Book Series; 1)
3. *GIS for Beginners*
- B. Shrestha, B. Bajracharya, Sushil Pradhan (ICIMOD)
4. *Principles of Geographical Information System, Peter. A. Burrough and Rachael A. McDonnell (4th Edition)*

Earth Science and Environment

EG2204ES

Year: II
Semester: II

Total: 6 hrs/week
Lecture: 2 hrs/week
Tutorial: 1 hrs/week
Practical: 3 hrs/week

Course Description:

The Earth Science and Environment curriculum focuses on the function of Earth's systems. Emphasis is placed on Environmental process, Environmental changes and Environmental awareness. Further, course target on use of GIS technology for acquiring and presenting spatial data.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area

1. Understand basic concept of Environment process and changes.
2. Acquire and present Spatial Data
3. Investigate and analyze the importance of Environmental Project

Course Content:

Unit 1: Introduction to Environment	2hrs
1.1 Elements of Environment	
1.2 Define Natural Environment	
1.3 Define The Man Made Environment	
1.4 Scope of Environment	
1.5 Importance of Environment	
Unit 2: Resources of the Earth	8hrs
2.1 Introduction to the major resources of the Earth,	
2.2 Define type of rocks and rock formulation process	
2.3 List out mineral resources	
2.4 Explain water type and source of water resources.	
2.5 Define soil and soil formation process	
2.6 List out composition of air	
Unit 3: Ecology and Ecosystem	3hrs
3.1 Define Ecology and Ecosystem	
3.2 List Physical Environmental and Biotic Factor	
3.3 Define Types of Ecosystem	
3.4 Define Terrestrial Ecosystem: Grassland Ecosystem, Forest Ecosystem	
3.5 Define Aquatic Ecosystem: Pond Ecosystem, Wetlands Ecosystem	
3.6 Define Food Web: Role of Food Web in Ecosystem	
Unit 4: Pollution	1hrs
4.2 Definition	
4.3 List Types - Air, Water, Land	
4.4 Sources of Pollution	
Unit 5: Air Pollution	2hrs
7.1 Types of Air Pollutants	
7.2 Sources of Air Pollution	
7.3 Effects of Air Pollution	

	7.4	Health Hazards	
	7.5	Air Pollution control Measure	
Unit 6:	Water Pollution		2hrs
	6.1	Types of water pollutants	
	6.2	Sources of Water Pollution	
	6.3	Effects of Water Pollution	
	6.4	Health Hazards	
	6.5	Water Pollution Control Measures	
Unit 7:	Land Pollution		2hrs
	7.1	Types of Land Pollutants	
	7.2	Sources of Land Pollution	
	7.3	Effects of Land Pollution	
	7.4	Health Hazards	
	7.5	Land Pollution Control Measures	
Unit 8:	Natural Disasters		4hrs
	8.1	Landslides: Causes of Landslides, Impact on Life and Economy, Control Measures	
	8.2	Floods: Causes of Floods, Impact on Life and Economy, Control Measures	
	8.3	Earthquake: Causes of Earthquake, Impact on Life and Economy,	
	8.4	Precautionary Measures	
	8.5	Drought: Causes of Drought, Impact on Life and Economy, Control Measures	
Unit 9:	Land Resource Mapping		3hrs
	9.1	Introduction to Land Resource Mapping in Nepal	
	9.2	Define Sustainable Development (Agenda 21)	
Unit 10:	Environment Assessment		4hrs
	10.1	Definitions and general principal of environmental assessment	
	10.2	Types of Environmental Assessments	
	10.3	(Environmental Impact Assessment, Environmental Impact Statement, Strategic Environment Assessment)	
Unit 11:	Environment Laws		4hrs
	11.1	Define Environmental Law	
	11.2	Domestic Environmental Law – Examples of Domestic Environmental Law	
	11.3	International Environmental Law – Foundations of Environmental Law, Making International Laws (Treaties and Customary Law), Milestones in International Environmental Law	
Unit 12:	Elementary Geology		3hrs
	12.1	Soil Types	
	12.2	Rock Types	
	12.3	Geological Mapping	
Unit 13:	Revision and Test		7hrs

References

1. *Ecology Principle and application*/J. L. Chapman, M. J. Reiss
2. *Environment and Biodiversity*/Edited by P. K. Jha ...[at el]

3. *Environmental Resource Management in Nepal/U. M. Malla, C. B. Shrestha*
4. *Environmental Pollution and Management/I. Mohan*
5. *EIA Training Manual for Professionals and Managers/IUCN, Nepal*
6. *Environmental Impact Assessment/ Batu KrisnaUprety*
7. *World Bank, 1992 World Development Report 1992; Development and Environment. Oxford Univ. 308 pp.*
8. *Advancing sustainable development: the World Bank and Agenda 21/The International Bank for Reconstruction and Development, The World Bank.*
9. *Land Utilization Report, 1986. Land Resource Mapping Project, Survey Department, Kathmandu*
10. *Environment Protection Act,1997 and Environment Protection Rules, Nepal*
11. http://www.ace.mmu.ac.uk/eae/sustainability/Older/Local_Agenda21.html
12. <http://www.moenv.gov.np/np/eia.php>

Earth Science and Environment – Practical

- Unit 1: Acquire and Update Spatial data of an area (5+15) hrs**
- 1.1 Fieldwork carried out under the direction or supervision of an instructor in the Program. Methods and principles of Environmental field work, sampling and sample location. Display and query spatial data and produce map products.
- Unit 2: Prepare a given environmental study report (5+20) hrs**
- 2.1 Student prepares report in any of the theme related to environment and carry out field work under the direction or supervision of an instructor in the Program. Final report should be prepared following standards and presented in class. Report will be assessed based on report format, discussion on environmental issues and data presentation.

Survey Computation and Adjustment

EG 2205GE

Year: II
Semester: II

Total: 7 hrs/week
Lecture: 2 hrs/week
Tutorial: 1 hrs/week
Practical: 4 hrs/week

Course Description:

This course deals with the computation and adjustments of field survey data related to control surveying.

Course Objectives:

After the completion of this course, students will be able to

1. Understand the principles of measurement errors
2. Understand the methods of computation used for surveying controls
3. carryout
 - Traverse surveying computation
 - Triangulation computation
 - Trilateration computation
 - Intersection and Resection computation
4. Understand and apply the techniques of adjustment commonly used in engineering surveying

Course Contents:

Unit: 1. Theory of measurement errors and adjustments	20hrs
1.1 Introduction	
- Basic Concept of errors	
- Classification of errors	
- Theory of errors	
- Methods of adjustment	
- Probability, Weight of the measurement	
1.2 Error Analysis	
- Arithmetic mean,	
- Standard deviation, Probable error	
- Law of normal distribution of random error	
- Limit error and tolerance in the measurement, RMS error of functions of measured quantities	
1.3 Error Adjustment	
- Concept of Least Square and methods of adjustment with least square	
Unit 2 Traverse Computation	5hrs
2.1 Computation of Bearings of the traverse legs with initial bearing and measured angles	
2.2 Computation of Bearing and distance from coordinates	
2.3 Open Traverse computation	
2.4 Computation of closed traverse on known points	

	2.5 Computation of closed traverse loop	
	2.6 Closing error, Permissible error	
	2.7 Distribution of error, correction	
Unit 3	Triangulation Computation	5hrs
	1.1 Simple chain of triangles and triangle misclosures	
	1.2 Spherical excess	
	1.3 Coordinate computation of simple chain of triangle	
	1.4 Error Adjustment of a Braced quadrilateral	
	1.5 Angle Condition and Side Condition equations	
	1.6 Error Adjustment in a central polygon	
	1.7 Coordinate computation of a central polygon	
Unit 4.	Intersection and Resection	3hrs
	4.1 Intersection computation	
	4.2 Resection Computation	
Unit 5:	Trilateration Computation	2hrs
	5.1 Slope -horizontal conversions	
	5.2 Solution of triangles and adjustment	
	5.3 Coordinate computation	
Unit 5:	Test and Revision	10hrs

References

1. *Surveying Volume I and II, Dr. Punmia, Laxmi Publications (P). Ltd, New Delhi, India*
2. *Surveying Vol. I and II, S.K Duggal, Tata McGraw-Hill Publishing Company Ltd. New Delhi, India*
3. *Fundamental of Surveying, S.K Roy, Prentice –Hall of India, New Delhi*
4. *Practical Field Surveying & Computations, A.L ALLAN,J.R. HOLLEY*
5. *Theory of errors & Adjustment, M.G Arur*

Survey Computation and Adjustment - Practical

Indoor

Unit 1.	Traverse Computation and adjustment	10hrs+12hrs
	1.1 Computation of Bearing and Distance from coordinates	
	1.2 Computation of Bearing from angles	
	1.3 Computation of coordinates	
	1.4 Error adjustment and computation of closed traverse	
Unit 2.	Triangulation Computation	10hrs+12hrs
	2.1 Compilation of angular observation data	
	2.2 Computation of triangle misclosures	
	2.3 Computation of spherical excess	
	2.4 Strength of figure	
	2.5 Error adjustment and coordinate computation in a braced quadrilateral	
	2.6 Error adjustment and coordinate computation in a central polygon	
Unit 3.	Intersection and Resection	4hrs+4hrs
	3.1 Computation of Coordinates from the Intersection	
	3.2 Computation of Coordinates from Resection observations	
Unit 4:	Trilateration Computation	4hrs+4hrs
	4.1 Slope -horizontal conversions	
	4.2 Solution of triangles and adjustment	
	4.3 Coordinate computation	

Third Year
(Semester V & VI)

Semester-V

EG3101GE	Cadastral Surveying
EG3102GE	Photogrammetry
EG3103GE	Remote Sensing
EG3104SH	Entrepreneurship & Community Skill
EG3105GE	Elementary Geodesy, Astronomy And GPS

Diploma in Geomatics Engineering
Curriculum Structure- Third Year/ First Part

Year: III

Part: I

Teaching Schedule			Mode					DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Lab	Total Hours	Theory			Practical				
								Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG3101GE	Cadastral Surveying	3	1	8		12	20	80	3	60	40		200	
2	EG3102GE	Photogrammetry	3	1	6		10	20	80	3	60	40		200	
3	EG3103GE	Remote Sensing	2	1		2	5	10	40	1.5	30	20		100	
4	EG3104SH	Entrepreneurship & Community Skill	2	1	3		6	10	40	1.5	30	20		100	
5	EG3105GE	Elementary Geodesy, Astronomy & GPS	3	1	3		7	20	80	3	30	20		150	
Total			13	5	20	2	40	80	320		210	140		750	

Cadastral Surveying

EG3101GE

Year: III
Semester: I

Total: 12 hrs/week
Lecture: 3 hrs/week
Tutorial: 1 hrs/week
Practical: 8 hrs./week

Course Description:

This course is designed for the students pursuing diploma in Geomatics Engineering. The focus of the course is to fulfill the requirement of survey technicians involving in the sector of cadastral surveying and mapping in Nepal.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and application of the same in the field of cadastral surveying:

1. Concept of cadastral surveying and mapping
2. Importance of cadastral surveying
3. Step by step approach to be followed for cadastral surveying
4. Advancement in the sector of cadastral surveying

Course Contents:

Unit 1. Fundamentals of Cadastral Surveying [20 hrs]

1.1. Introduction

- Definitions: Cadastral Surveying, Adjudication, Cadastre, Parcel, Boundary, and other relevant terms
- Importance of cadastral surveying for land administration and management
- History of Nepalese Cadastral Surveying

1.2. Cadastral maps

- Principles of cadastral mapping in Nepal Map scale, Units (Revision)
- Control Points for Cadastral Surveying and preparation of cadastral sheets
- Concept of Plotting Error
- Parcel numbering or unique parcel ID
- Specifications and Standards

Unit 2. Cadastral Data Acquisition [15 hrs]

2.1 Plane Tabling Technique of data acquisition

- Plane Table and Accessories
- Data acquisition process

- Field Book Preparation
- Inking and tracing of cadastral maps
- Area Computation and checking
- Quality management: Field Supervision

2.2 Concept of Digital Cadastre

- Equipment (Total Station), tools and accessories for data acquisition
- Preparation for data acquisition
- Data Recording for parcel boundary
- Field Book Preparation
- Data download

2.3 Parcel delineation from Orthophoto

Unit 3. Cadastral Surveying in Nepal [10 Hrs]

3.1 Organizational Structure

3.2 Cadastral Surveying Process: Systematic Adjudication process

- Notification
- Densification of Control Points
- Adjudication
- Surveying and Mapping (Data Acquisition, Unit 2)
- Land Classification
- Area Computation
- Document Preparation
- Registration of Ownership
- Settlement of Civil Cases and Disputes
- Data Management
- Handing Over of cadastral data

3.3 Adjudication: (Sporadic and Systematic), Sporadic Adjudication and maintenance of survey records

Unit 4. Modern Cadastre: example of developed cadastre [5 Hrs]

4.1 General Introduction to Modern Cadastre

4.2 Examples of Modern Cadastre

Revision and Test [10 Hrs]

Reference Books

1. *Cadastral Survey within the commonwealth P.F Dele, MA ARICS (1976)*
2. *Land Registration and Cadastral System, Gerhard Hursson*
2. *Surveying Vol I and II, S.K DUGGAL*
3. *कित्ता नापी निर्देशिका, नापी विभाग*
4. *नापी शाखा एवं नापी गोश्वाराको कार्यविधि, नापी विभाग*
5. *कित्ता नापी, बेखलाल श्रेष्ठ*
6. *Plane Surveying, David Clark*
7. *भूमिलगत रजिष्ट्रेशन र कित्ता नापी, बेखलाल श्रेष्ठ*

Cadastral Surveying Practical

- Unit 1. Indoor Exercise** **[15hrs+15 hrs]**
- 1.1 Organisation of Field Data
 - 1.2 Inking and Tracing Exercise of Graphical Cadastral Map
 - 1.3 Area Computation in Analogue Environment
 - Using tiles and computing scale
 - Using triangle formula
 - Using coordinates
 - 1.4 Documentation of cadastral activities: field book, notice, land registration records, land registration certificates, etc
 - 1.5 Parcel subdivision
 - 1.6 Demonstration of Digital Cadastral mapping
 - Data Download
 - Plotting
 - Area Calculation
 - Creating parcel ID
 - Labeling features
 - Visualization
- Unit: 2 Outdoor Exercise** **[90 hrs]**
- 2.1 Cadastral data acquisition on the scale of 1:500 using Plane Table (Step by step approach to be followed by Nepalese cadastral surveying)
 - 2.2 Numerical cadastral survey of selected land parcels using theodolite
 - 2.3 Parcel Identification and Boundary demarcation or layout

Photogrammetry

EG 3102GE

Year: III
Semester: V

Total: 7 hour /week
Lecture: 3 hours/week
Tutorial: 1 hour/week
Practical : 3 hours/week

Course Description:

This subject consists of Eight units related to Photogrammetry necessary to familiarize students on elementary knowledge of Photogrammetry helpful for the understanding and practicing the related engineering works.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of related engineering area:

1. Terminologies of Photogrammetry
2. Aerial camera and scale of the photograph
3. Stereoscopic vision techniques
4. Different photogrammetric equipment
5. Techniques of aerial triangulation
6. To recognize the features in the aerial photograph
7. Method of photo mosaic and its use
8. Procedure of mapping by photogrammetric method

Course Contents:

Unit 1.	Introduction	[8 hrs]
1.1.	Define Photogrammetry	
1.2.	Explain briefly the History of Photogrammetry	
1.3.	Define Projection and list out the properties of Orthogonal and Perspective Projections	
1.4.	Define the following Terminologies:	
	<ul style="list-style-type: none">• Fiducial Marks• Fiducial Axis• Nadir Point• Principal Point• Perspective Centre• Focal Length• Principal Distance• Camera axis• Principal Axis• Principal Plane	

- Principal Line
 - Photo Plane
 - Isocentre
 - Homologous Points
 - Tilt
 - Format of Photograph
- 1.5. Explain the Components of Photogrammetry
 - 1.6. Explain the scope of Photogrammetry in Survey Profession
 - 1.7. Compare Aerial Photograph and Map

Unit 2. Aerial Photography **[9 hrs]**

- 2.1. Explain basic concepts and types of aerial camera
- 2.2. Define Essential parts of an aerial camera
- 2.3. Define the following Types of lens
 - Narrow Angle,
 - Normal Angle
 - Wide Angle
 - Super Wide Angle
- 2.4. Define and familiarize with the application of:
 - Vertical
 - Oblique: Low oblique and high oblique
- 2.5. Explain Aerial Photographic process
- 2.6. Derive the formula for Scale of Vertical Aerial Photograph
- 2.7. Determine Scale of a Photograph
- 2.8. Define Relief Displacement and derive formula to find out the value of relief displacement
- 2.9. Define Tilt Displacement
- 2.10. Define familiarize with the need of:
 - Overlap : Forward and Lateral
 - Drift and Crab

Unit 3. Stereoscopy **[9 hrs]**

- 3.1. Define Stereoscopic Vision and list out conditions for seeing stereoscopic vision
- 3.2. Define Parallax and derive Parallax Equation
- 3.3. List out the process for Orientation of Pair of Photographs
- 3.4. Explain the methods for Stereoscopic Viewing using the following techniques
 - Pocket and Mirror Stereoscope
 - Anaglyph System
 - Modern Methods

- 3.5. Identify the Orientation Elements of a photograph and show their motion
- 3.6. Explain Stereo restitution
- 3.7. Define the following:
 - Inner orientation
 - Exterior orientation: Relative and Absolute orientation
 - Point transfer and Image matching
 - Rectification

Unit 4. Introduction to Photogrammetric Instruments [8 hrs]

- Stereo Plotters
 - Optical Projection Plotter
 - Mechanical Projection Plotter
 - Analytical Plotters
- Digital Photogrammetric workstation

Unit 5. Aerial Triangulation [8 hrs]

- 5.1. Define Aerial Triangulation
- 5.2. Explain its Purpose
- 5.3. Describe Principle of Aerial Triangulation
- 5.4. Describe methods of Aerial Triangulation

Unit 6. Photo Interpretation [3 hrs]

- 6.1. Define Photo Interpretation
- 6.2. Explain the Basic Characteristics of Photographic images
- 6.3. Describe photo interpretation elements

Unit 7. Photogrammetric Procedure [6 hrs]

- 8.1. Explain Elements of Photogrammetric mapping
- 8.2. Define and describe briefly the process of Generating Digital Elevation Model (DEM)
- 8.3. Define Ortho Rectification and describe briefly the process of orthophoto production
- 8.4. Differentiate aerial and orthophoto
- 8.5. Orthophoto Mosaic
- 8.6. Feature extraction

Revision and Test [6 hrs]

Reference Books

1. *Elements of Photogrammetry, by Paull R. Wolf, MCGRAW HILL INTERNATIONAL EDITION*
2. *Interpretation of Aerial Photographs, T.Eugene Avery*
3. *Remote Sensing Principal And Image Interpretation, Thomas M. Lillesand, Ralph W. Kiefer*
4. *MANUAL OF PHOTOGRAMMETRY (Third Edition) Volume I and II by Morris M. Thompson*

PHOTOGRAMMETRY PRACTICAL

- Unit 1: Introduction** [8hrs+8 hrs]]
- 1.1 Practice Stereoscopic Vision Using Pocket Stereoscope
 - 1.2 Mark Principal Points in the Photographs
 - 1.3 Practice Transfer of points on Adjacent Photographs using Mirror Stereoscope
 - 1.4 Draw Principal Lines in the Photographs
- Unit 2: Some Measurements** [5hrs+5 hrs]
- 2.1 Calculate Scale of the Photograph
 - 2.2 Calculate Area of Photograph
 - 2.3 Determine effective area of a Photograph
- Unit 3: Exercise on Aerial Photographs** [10hrs+10 hrs]
- 3.1 Measure Forward and Lateral Overlap of the photographs
 - 3.2 Select and mark Minor Control Points in a block of Aerial Photographs
 - 3.3 Prepare Photo Index
 - 3.4 Prepare a Photo Mosaic
 - 3.5 Identify Selected Features on Aerial Photograph
- Unit4: Exercise on Digital Photogrammetry** (12hrs+12hrs)
- 4.1 Get acquainted with digital photogrammetric workstation
 - 4.2 Interior orientation- Demonstration
 - 4.3 Exterior Orientation- Demonstration
 - 4.4 Aerial Triangulation - Demonstration
 - 4.5 DTM Generation- Demonstration
 - 4.6 Ortho-photo Production- Demonstration
 - 4.7 Feature Extraction- Demonstration

Remote Sensing

EG3103GE

Year: III
Semester: I

Total: 5 hour /week
Theory: 2 hours/week
Lecture: 1 hours/week
Practical: 2 hours/week

Course Description:

This course is designed for the students pursuing diploma in Geomatics Engineering. The course covers the fundamental concept of remote sensing

Course Objectives:

After the completion of this course, students will be able to:

1. Understand the basic concepts of remote sensing Principles
2. Explore and interpretation the satellite images
3. Perform the simple operation with remotely sensed data
4. Conceptualize the application of Remote sensing data

Unit 1: Introduction to Remote Sensing (10 hrs)

- 1.1 Definition
- 1.2 Components of Remote Sensing
- 1.3 Energy & Sensor
- 1.4 Interacting Body - Active and Passive Remote Sensing
- 1.5 Sensor Platforms (Balloons, Helicopters, Aircraft and Satellites)
- 1.6 Electro Magnetic Radiation (EMR) ,
- 1.7 EMR spectrum: Visible, Near IR, Middle IR, Thermal IR and Microwave

Unit 2: EMR interaction with Atmosphere and Earth Materials (12hrs)

- Atmospheric characteristics
- Scattering of EMR
- Raleigh, Mie Scattering
- EMR Interaction with Water vapor and ozone
- Atmospheric Windows
- Significance of Atmospheric windows
- EMR interaction with Earth Surface Materials
- Radiance, Irradiance, Incident, Reflectance,
- Absorbed and Transmitted Energy Reflectance
- Specular and Diffuse Reflection Surfaces- Spectral Signature
- Spectral Signature curves
- EMR interaction with water, soil and Earth Surface

Unit 3 : Image Interpretation, Enhancement and Classification

8hrs

- Familiarizing with different types of images: Panchromatic Multi-spectral, Hyperspectral
- Visual Interpretation of Satellite Images
- Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image
- Image enhancement
- Filtering
- Classification – Supervised classification and unsupervised classification
- Signature collection and merging signatures
- Image mosaic

Test and Revision

15hrs

Remote Sensing Practical

Lab Exercise

(30 Hrs)

1. Observation of image and reading pixel data
2. Observe image bands of multi spectral images
3. Stacking layers and prepare multi spectral images
4. Geo-reference satellite image
5. Classify Satellite Images
6. Mosaic images Image
7. Enhance Image

Text Books

1. M.G. Srinivas (Edited by), *Remote Sensing Applications*, Narosa Publishing House, 2001. (Units 1 & 2).
2. Anji Reddy, *Remote Sensing and Geographical Information Systems*, BS Publications 2001 (Units 3, 4 & 5).

Reference

1. Jensen, J.R., *Remote sensing of the environment*, Prentice Hall, 2000.
2. Kang-Tsung Chang, "Introduction to Geographic Information Systems", TMH, 2002
3. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
4. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol. I., American Society of Photogrammetry, Virginia, U.S.A, 1975.
5. Burrough P A, *Principle of GIS for land resource assessment*, Oxford
6. Mischael Hord, "Remote Sensing Methods and Applications", John Wiley & Sons, New York, 1986.
7. Singal, "Remote Sening", Tata McGraw-Hill, New Delhi, 1990.
8. Floyd F. Sabins, *Remote sensing, Principles and interpretation*, W H Freeman and Company 1996.

Entrepreneurship & Community Skill (EG3104SH)

Year: III
Semester: VI

Total: 6 Hours/ week
Theory: 2 Hours/ week
Tutorial: 1 Hours/ week
Practical: 3 Hours/ week

Course Description:

The course focuses on the basic concepts community skill and Entrepreneurship. This also includes the concept of planning a small scale business.

Course Objective:

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

1. explain basic concept and uses of community.
2. define basic concepts and skills of community knowledge and Management of business.
3. explain basic concepts of entrepreneurial skills in making Business of their profession.

Course Content

Unit 1	Introduction to community.	3hrs
	1.1. Define community (with its types, characteristics and functions)	
	1.2. Roles of members of community in development.	
	1.3. Define human nature (Needs, Interests, Emotion)	
	1.4. Define motivation	
	1.5. Maslow's ladder of human needs.	
	1.6. Importance of community skills for surveyors.	
Unit 2	Community development	2hrs
	2.1 Define development	
	2.2 Concept of sustainable development, Human development and community Development.	
	2.3 Explain different development Approaches (Concept of community Participant, Empowerment, mobilization, PRA, APA)	
	2.4 Define development Agencies.	
Unit 3	Resources of community	
	3.1 Community Members	
	3.2 Institutions and knowledge	
	3.3 Technology	
	3.4 Natural Resources	
	3.5 Relationship	
Unit 4	Community Resource Mobilization	2hrs
	4.1 Assessment of resource in use	
	4.2 Institutions/ local organizations and their mobilization	
	4.3 Exploration of new resources for effective management: - local products, Technologies, Institutions	
Unit 5	Building awareness, co- ordination and organization	2hrs
	5.1 Stage of Project life cycle	
	5.2 Define co-ordination	
	5.3 Networking with public, CBos, NGos, and INGos	

	5.4	Define organization	
	5.5	Organization formulation	
Unit 6		Form user group and conduct its meeting	5hrs
	6.1	Define and conduct user group	
	6.2	Definition and allocation of roles	
	6.3	Role of catalyst	
	6.4	Purpose of user group	
	6.5	Introduction to Agenda setting	
	6.6	Meeting organization and discussions	
	6.7	Digging deeply in discuss	
	6.8	Root causes of problem	
Unit 7		Conduct training	3hrs
	7.1	Define training and its need	
	7.2	Brain storming (need, rules of doing Brainstorming)	
	7.3	Importance of local knowledge for training	
	7.4	Basic Idea of 4 'C' Approach	
	7.5	Define Presentation	
	7.6	Adult learning principle	
	7.7	Learning tools	
Unit 8		Entrepreneurship and Entrepreneur	4hrs
	8.1	Define Entrepreneurship and Entrepreneur	
	8.2	Sources of business Information	
	8.3	Prioritization of goals	
	8.4	Problem solving procedures	
	8.5	Risk calculation methods	
Unit 9		Business in operation	3hrs
	9.1	Define Business	
	9.2	Sources of Idea generation for Business	
	9.3	Forms of Business organization	
	9.4	Identification of Funding Resources promoters, Banks	
	9.5	Explain SWOT Analysis	
Unit 10		Management and Planning of Business	5hrs
	10.1	Meaning, concepts and Definition of Business	
	10.2	Explain managerial functions (planning, organizing, coordination and Controlling)	
	10.3	Sources of Management Assistance	
	10.4	Introduction to business plan and its component	
	10.5	Rules and regulations of government for establishing small business.	
	10.6	Planning in Small business	
	10.7	Sources of machinery and raw materials	
	10.8	Calculation of pro- project expenses, cost price, sale price, BEP, ROI, market Share, production level and deprecation.	
Unit 11		Human Resource Management	2hrs
	11.1	Define Human Resources	
	11.2	Team Building	
	11.3	Leadership skill	
	11.4	Recruitment and Selection	
	11.5	Placement of Human Resource	
	11.6	Concept of Human Resource development	

Unit 13	Determine marketing	2hrs
13.1	Define market and marketing	
13.2	Introduction to 4ps (Basic idea about product, price, place and problem)	
13.3	Introduction to product life cycle	

Unit 15	Communication for business	2hrs
15.1	Define Communication	
15.2	List the types of Communication	
15.3	Means of Communication	

Revision and Test **10hrs**

Reference Books

1. *Introduction to Marketing – Dr. Fatta Bahadur K.C*
2. *Entrepreneurship Development by Devendra Manandhar (CTEVT)*
3. *Effective Performance in Project Management, Jan Wisen and orje Lindblom*
4. *Community Development Reports published by different NGOs and INGOs*
5. *Samudayik Bikas, Nepali Sandhrave by Krishna Bahadur K.C, Published by: Society for community development Professionals, 1990*

Entrepreneurship & Community Skill Practical

A. Community Study – Report Writing

10 hrs+10 hrs

Students are required to prepare a study report individually of a given Community. The study will be based on any of the following theme of the community

6. Theme of Study of a community

- Education
- Social problem (girl trafficking, corruption, Drug peddling , terrorism etc)
- Economic activities
- Family Size and Structure
- Developments Infrastructure and Nature Resources census
- Gender and Domestic conflict

7. Guidelines for preparing study report

Outline of the report

- a. Background of the study
- b. Study Area (description & Maps)
- c. Objectives
- d. Methodology
- e. Data Analysis and Result
- f. Limitation of the study
- g. Conclusion and Re commendation
- h. Acknowledgement
- i. Annex

B. Prepare Business Plan of a company

(10hrs+ 10 hrs)

Guidelines

1. Steps to be followed for preparing Business Plan

- Releasing the need for planning
- Setting objectives
- Identification and Evaluation of Alternative courses.
- Site Selection
- Demand and supply Analysis
- Market Analysis
- SWOT Analysis
- Market Analysis
- Collection of Budget
- Allocation of Budget
- Collection of raw materials
- Promoters Activities
- Implementation
- Evaluation

Elementary Geodesy, Astronomy and GPS

EG 3105GE

Year: II
Semester: II

Total: 7 hours/week
Lecture: 3 hours/week
Tutorial: 1 hours/week
Practical: 3 hours/week

Course Description:

The course content is focused on elementary knowledge on Geodesy, astronomy and GPS. The includes the application of GPS in surveying and mapping.

Course Objectives:

After the completion of this course, students will be able to

- Understand the basic concept of Geodesy, astronomy and GPS
- Determine the position and direction using sun and star observation
- Use handheld GPS for data capture

Course Contents:

A. Elementary Geodesy

Unit 1.	Figure of the Earth	4hrs
1.1	Shape and Size of the Earth	
1.2	Spheroid and Geoid	
1.3	Everest spheroid and its parameters	
Unit 2.	Coordinate systems	4hrs
2.1	Geographical Coordinates	
2.2	Rectangular Coordinates	
2.3	Concept of coordinate conversion: Geographical to rectangular	

B. Astronomy

Unit 3.	Introduction	3hrs
1.8	Solar System	
1.9	Kepler's Laws of Planetary motion	
Unit 4.	Celestial Sphere	8hrs
1.8	Definitions	
1.9	Spherical triangle spherical excess	
1.10	Application of sine and cosine formulae of spherical trigonometry	
1.11	System of celestial coordinates	
•	Altitude and Azimuth	

	<ul style="list-style-type: none"> • Right Ascension and Declination 	
	1.12 Astronomical Triangle	
Unit 5.	Time	8hrs
	5.1 Solar Time	
	5.2 Siderial Time, Mean Solar Time and Apparent Time	
	5.3 Conversion to mean Solar Time to Siderial time and Vice versa.	
	5.4 Greenwich Mean Time, Universal time	
	5.5 Local Time, Standard Time	
	5.6 Star Almanac	
Unit 6.	Astronomical Observations	4hrs
	6.1 Determination of Azimuth by Sun observation.	
	6.2 Determination of Latitude, Longitude and Azimuth by star observation,	
Unit 7.	Global Positioning system (GPS)	5hrs
	7.1 Introduction to GPS	
	7.2 GPS Segments	
	7.3 GPS orbital parameters	
	7.4 WGS- 84	
	7.5 Principle of GPS Positioning	
	7.6 Absolute and relative Positioning	
	7.7 Static and kinematic modes in GPS Survey	
	7.8 GPS geometry and Accuracy	
	7.9 Satellite system: GNSS and GLONASS	
Unit 8.	GPS Post Processing Concept	2hrs
	3.2 Software, Rinex Conversion	
	3.3 WGS -84 Coordinates	
Test and Revision		7hrs

Reference Books

1. *Surveying Volume III, Dr. B.C Punmia, A.K Jain, Laxmi Publication Pvt. Ltd. India*
2. *Surveying Vol. I and II, S.K Duggal, Tata McGraw-Hill Publishing Company Ltd. New Delhi, India*
3. *Engineering Surveying, W. Schofield, Butter Worth, Heinemann*
4. *Triangulation Instruction Book , Geodetic Survey Branch, Nepal*
5. *Fundamental of Surveying, S.K Roy, Prentice –Hall of India, New Delhi*
6. *GPS Theory & Practice, B.Hofmann, J.Collion et al.*

Elementary Geodesy, Astronomy and GPS- Practical

Unit 1. Astronomy

(5hrs+10hrs)

1.1 Sun Observation

- Observe Sun for Azimuth determination
- Compute observed data for Azimuth determination

1.2 Polar Observation

- Observe star for Azimuth determination
- Compute observed data for Azimuth determination

Unit 2. Global Positioning System (GPS)

(10hrs+10hrs)

2.1 Hand held GPS

- Operate GPS device
- Capture Position Data
- Navigate Position
- Tracking Routes
- Plotting GPS data (Demonstration)

2.2 Geodetic GPS

10hrs

- Static Positioning (Demonstration)
- Differential Positioning (Demonstration)
- Post Processing (Demonstration)

Semester -VI

EG3201GE	Survey Management
EG3202GE	Land Administration and Land Laws
EG3203SE	Civil Construction
EG3204SE	Quantity Surveying
EG3205GE	GIS Applications
EG3206GE	Engineering Survey
EG3207GE	Project Work

Diploma in Geomatics Engineering Curriculum Structure- Third Year/ Second Part

Year: III

Part: II

Teaching Schedule			Mode					DISTRIBUTION OF MARKS						Total Marks	Remarks
S.N	Course Code	Course Title	L	T	P	Lab	Total Hours	Theory			Practical				
								Asst. Marks	Final Marks	Time Hours	Asst. Marks	Final Marks	Time Hours		
1	EG3201GE	Survey Management	2	1			3	10	40	1.5				50	
2	EG3202GE	Land Administration and Land Laws	2	1			3	10	40	1.5				50	
3	EG3203SE	Civil Construction	2	1	2		5	10	40	1.5	30	20		100	
4	EG3204SE	Quantity Surveying	2	1	2		5	10	40	1.5	30	20		100	
5	EG3205GE	GIS Applications	2	1		6	9	10	40	1.5	60	40		150	
6	EG3206GE	Engineering Survey	2	1	4		7	10	40	1.5	30	20		100	
7	EG3207GE	Project Work			8		8				120	80		200	
Total			12	6	16	6	40	60	240		270	180		750	

Survey Management

EG3201GE

Year: III
Semester: II

Total: 3 hour /week
Lecture: 2 hours/week
Tutorial: 1 hours/week
Practical : 0 hours/week

Course Description:

This course is designed to provide basic idea of survey management. The main focus lies on the management of surveying and mapping projects. The course includes some important aspects of survey management such as terms of reference, specification, project planning, resource allocation, costing, executing surveying projects and reporting.

Course Objective:

The main objective of this course is to make the mid-career survey professionals aware about various aspects of surveying and mapping projects. It is aimed that at the completion of the course, a student will be able to

- Formulate a surveying and mapping project proposal
- Planning of a minor surveying and mapping projects
- Identify needs for surveying and mapping projects
- Understand the terms of reference and specifications of a particular project
- Estimate the cost of minor surveying and mapping projects
- Reporting minor surveying and mapping projects

Course Content:

Unit 1:	Introduction	4 hrs
	1.1 Concept and definition: Management, Project, Project Management, etc	
	1.2 Types of surveying: based on purpose, methods, and use	
	1.3 Major Tasks of Surveying and Mapping Project	
Unit 2:	Essential Components of Survey Management	10 hrs
	2.1 Terms of Reference, Technical Standards and Specifications	
	2.2 Project Planning	
	2.3 Resource Management: Human Resources (Task Identification and Distribution), Financial Resources, Tools, Equipments and Accessories	
	2.4 Costing: Concept of Activity Based Costing (ABC Costing)	

2.5 Survey Project Implementation

2.6 Quality Management: Task Supervision, Instrument Adjustments

2.7 Output Management

Unit 3: Public Relation and Professional Ethics **5 hrs**

3.1 Public Relation, Inter –organizational Coordination

3.2 Ethics and Code of Conduct of Surveyors

3.3 Concept of Legal provision and government policy governing a particular
Survey Project

3.4 Survey Licensing

Unit 4: Proposal and Report Writing Skill **12 hrs**

4.1 Language Proficiency in Writing -English/Nepali

4.2 Writing Technical Proposal: Structure and Contents

4.3 Writing Financial Proposal: Structure and Contents

4.4 Report Writing: Structure and Contents

4.5 Presentation Skill

Unit 5 Safety Management **10hrs**

5.1 Care and safety of instrument

5.2 Rescue measures

5.3 Insurance

5.4 Personal safety

5.5 First aid

- Preserving life
- Prevent further injury
- Promoting recovery

5.5.1 Conditions that often require first aid

- Altitude sickness, swelling of brain or lungs
- Allergens, such as insect bites
- Bone fractures
- Burns
- Chocking
- Cramps
- Heart attacks
- Hyperglycaemia
- Hypothermia
- Poisoning
- Insect and animal bites
- Muscle strains
- Stroke

- Snake bite
- Wounds and bleeding(including lacerations, incisions and abrasions, Gastrointestinal bleeding, avulsions and Sucking chest wounds)
- Heat induced illness

5.5.2 Equipments: First aid kits(Components, list, contents)

Test and Revision

4hrs

Reference Books

1. *Cadastral Survey within the commonwealth P.F Dele, MA ARICS (1976)*
2. *Effective Performance in Project Management, Jan Wisen and orje Lindblom*
3. *Project proposals and reports from different organizations*

Land Administration and Land Laws

EG3202GE

Year: III
Semester: II

Total: 3 hour /week
Lecture: 2 hours/week
Tutorial: 1 hours/week

Course Description:

This subject consists of two units related to Land Administration and Land Laws. These topics cover the general aspects of land administration system and legal arrangements made for addressing land related issues in Nepal.

Course Objectives:

After the completion of this course, students will be able to explain the concepts of the followings and apply them in the field of Land Surveying.

1. General concept of land administration and management
2. Role of land administration and management in Social/National development
3. Issue of land administration and legal arrangement made to address the problems
4. Support the land administration functions and solve the real world problem by making use of proper acts/ rules/directives

Course Contents:

Unit 1: Land Administration

1.1 Introduction 2 hrs

- Land: Definition and concept, importance of land for human being, Importance of land in national development
- Land Administration: Definition and concept, General function of land administration, importance of land administration, components of land administration

1.2 Land Tenure and Rights 4 hrs

- Land tenure: Definition and concept, History of land tenure, Land tenure system in Nepal; (Freehold, Leasehold, Guthi)
- Land right: concept, different types of right on property: use right, access right
- Security of land tenure and its importance

1.3 Land Registration System 3 hrs

- Concepts and definitions
- Concept of first registration

- Different Land Registration Systems: Conveyancing, Deeds, Title
 - Land registration system in Nepal: Historical Background, Existing Registration System, Processes
- 1.4 Land and property transfer process 3 hrs**
- Different types of land transactions (Rajinama, Anshabanda, Bakaspatra etc) and their process:
 - Whole parcel transaction,
 - Parcel subdivision,
 - Individual/ multiple / institutional ownership
- 1.5 Land conflicts and their resolutions 3 hrs**
- Types of boundaries
 - Land disputes Related to parcel boundary , Land Area and Ownership
 - Land Tenureships
 - Mediation and its role in land dispute settlement
- 1.6 Land Management 4 hrs**
- Concept, meaning and definition of land management
 - Land Use: Concepts and determinants, land use planning, land use zones, Importance of land use zoning
 - Land ownership: Right, Restriction and Responsibility
- 1.7 Land Valuation 4hrs**
- Land Value
 - Land Valuation Parameters
 - Land Valuation techniques
 - Land Market
 - Land Taxation
- 1.8 Land Information System in Nepal 4 hrs**
- LIS: concept and definition
 - Components of LIS
 - Data Sources
 - Processing, Storage , Maintenance and dissemination
 - Importance of LIS
 - LIS development in Nepal: challenges
- 1.9 Institutions related to Surveying mapping and Land Administration 3hrs**

- Introduction to related institutions in Nepal (Land Revenue Office, Survey Offices, DOLIA, Land Reform, Guthi Corporation etc.)
- Basic Introduction about International Organization (FIG, PCGIAP, AARS, ISPRS)

Unit 2: Land policy, Laws and Directives

2.1 Land policy 3 hrs

- Policy: concept and definition
- Policy formulation procedure
- Importance of land policy
- Land Policy in Nepal

2.2 Land Laws in Nepal 5 hrs

- Concepts, needs and definition
- Historical Background
- Law making processes
- Constitution of Nepal (Related sections)
- Land (Survey and Measurement) Act and Rules
- Land related Act and Rule
- Land Revenue Acts and Rule
- Muluki Ain (related section)

2.3 Circulars and Directives 2 hrs

- Land Administration Directives
- Cadastral Survey Directives

Test and Revision 4 hrs

References:

- *Land law and registration: S.R. Simpson*
- *Land registration: B. L. Shrestha*
- *Bhumi lagat, registration ra kittanapi: B.L. Shrestha*
- *Land (Survey and Measurement) Act 2019 and Rules 2058*
- *Land related Act 2021 and Rule*
- *Land Revenue Acts 2034 and Rule*
- *Muluki Ain (related section)*
- *Kittanapi karyabidhi- Survey Department of Nepal*
- *Jagga prashashan karyabidhi - Survey Department of Nepal*

Civil Construction

EG 3203 SE

Year: III
Semester: II

Total: 5 Hours/week
Lecture: 2 Hours/week
Tutorial: 1 hours/week
Practical : 2 hours/week

Course Description:

This course includes basic introduction of construction materials, Building construction, Road Construction, Irrigation System, Water Supply and sanitation System, River training works,, Estimating and costing .

Course Objectives:

After the completion of this course, students will be able to

1. Explains the major items of work required for building construction
2. Interpret simple road alignment geometry
3. Understand elements of simple irrigation system
4. Understand basics of Water Supply and sanitation system

Course Contents:

Unit 1.	Introduction	[4 hrs]
	1.1. Definition of the construction works	
	1.2. Elements of the construction works	
	1.3. Mode of implementing construction works	
	1.4. Basic of the technical drawings	
Unit 2.	Construction materials	[6 hrs]
	Types, characteristics of brick, stones, aggregates, cement, steel and wood	
Unit: 3	Building Construction	[6 hrs]
	3.1 Buildings elements	
	- Foundation & Superstructure (walls, flooring, roofing, doors and windows)	
	- Stones masonry, Brick Masonry, plain Cement concrete, form work, plastering / painting.	
Unit 4:	Road construction	[6 Hrs]
	4.1 Classification of roads	

- National highways
 - Feeder roads
 - District roads/Village roads
 - City roads or streets
- 4.2 Road geometry
- Horizontal and vertical alignments
 - Cross sectional elements (camber, super elevation etc)
 - Sight Distance characteristics (stopping overtaking sight distances)
- 4.3 Road pavement
- 4.4 Structures (Bridge, Culvert, Retaining wall, breast walls)
- 4.5 Properties of soil and stone aggregate used in road construction

Unit 5: Irrigation System

[6 hrs]

- 5.1 Concept and importance of irrigation system
- 5.2 Type of irrigation system
- 5.3 Components of small scale irrigation system
- 5.4 Water Distribution management

Unit 6 River training works

[2 hrs]

- 6.1 Purpose of river training works
- 6.2 Methods of river training

Unit 7 Water Supply and sanitation Systems

[8 hrs]

- 7.1 Sources of water
- 7.2 Discharge measurement by velocity-area method
- 7.3 Discharge measurement by bucket-stop watch method
- 7.4 Introduction to and type of water supply system
- 7.5 Gravity flow water supply system
- 4.6 Intake- purpose, major parts of intake, points to consider while selecting the site for intake
- 4.7 Pipeline – transmission, distribution
- 4.8 Interruption/ break pressure tank
- 4.9 Valve chambers
- 4.10 Distribution chambers
- 4.11 Treatment of water- sedimentation, filtration, disinfection

- 4.12 Reservoir tank
- 4.13 Stand posts

- 7.6 Spring protection
- 7.7 Pipe and pipe fittings
- 7.8 Tools and equipment used in plumbing works
- 7.9 Ferro cement technology and its application in reservoir construction
- 7.10 Concept of hydraulics and pipeline design
- 7.11 Tube well system
- 7.12 Sanitation system
 - 4.14 On-site sanitation -VIP Latrine, Sulav Latrine, Eco-san Toilet
 - 4.15 Water borne sanitation- toilet with septic tank system, sewer pipeline system, sanitary sewer treatment process

Test and Revision

[7 hrs]

Reference Books

1. *Building Construction Sushil Kumar*
2. *Engineering Costing and Supervision (CTEVT)*
3. *भवन निर्माण- प्रा.शि. तथा व्या.ता. परिषद्*
4. *ग्रामीण खानेपानी प्रणाली निर्माण तथा व्यवस्थापन - हरियुसाद शर्मा*
5. *Engineering Materials, Surendra Singh*
6. *Lecture notes on basic construction*

Civil Construction Practical

Unit 1.	Sizing and drawing of Engineering Structures	[22 hrs]
	<ul style="list-style-type: none">- Sizing and drawing of simple structures based on data obtained from engineering survey field work- Fixing alignment of a road between two points given on a contour map- Rural village water supply scheme- Drawing of simple building- Drawing of simple irrigation canals	
Unit 2.	Outdoor One day field visit of construction site	[8 hrs]

Quantity Surveying

GE 3204 SE

Year: III
Semester: II

Total: 5 Hours/week
Lecture: 2 hours/week
Tutorial: 1 hrs/ week
Practice: 2 hours/week

Course Description:

- *This course includes 5 units which partially covers works related to quantity estimation of Building construction, Road Construction, Water Supply and sanitation works.*

Course Objectives:

- *The course is aimed at providing the students a background on procedures in quantity estimating of various items of Engineering structures and their specification along with their cost estimates. The students may use this knowledge in evaluation of system as well as monitoring the content during construction time.*
- *To train the students in technical and analytical skills required to enable them to function and practice professional quantity surveyor on all aspects of civil engineering works.*

After the completion of this course, students will be able to;

- Explain the different units of measurements used for quantifying the item of construction works
- Explain the major items of work required for construction like building, irrigation, road, watersupply etc.
- Describe the need and procedures of estimating quantity and cost, carry out the rate analysis, quantity estimate and costing of some of the major items of work related to Building, Road etc.

Course Contents:

Unit 1 Introduction

[2 hrs]

- 1.1. General
- 1.2. Systems of units
- 1.3. Units of measurement and payments for Items of works and materials.
- 1.4. Requirements of quantity surveying and costing.
- 4.6 Data required for the preparation of an estimates.

Unit: 2 Types of estimates

[4 hrs]

- 2.1 Preliminary estimates
- 2.2 Plinth area estimates
- 2.3 Cube rate estimates
- 2.4 Approximate quantity estimate

- 2.5 Detailed estimates
- 2.8 Annual maintenance estimates
- 2.7 Complete estimates

Unit: 3 Methods of Estimating/Procedure of estimating **[6 hrs]**

- 4.16 Main items of works, sub heads of various items of work
- 4.17 Various forms used in estimating
- 4.18 Various methods of taking out quantities
 - 1. Center line method
 - 2. Long and short wall method
 - 3. Crossing method
- 4.19 Method of measurement of various works.
- 4.20 Abstracting bill of quantities.

Unit 4: Analysis of rates **[8 hrs]**

- 4.1 Introduction
- 4.2 Purpose of rate analysis
- 4.3 Factors affecting rate analysis
- 4.4 Rates of materials (Use Government norms)
- 4.5 Procedure of rate analysis for
 - a. For Building works
 - Earthwork
 - P.C.C. & RCC
 - Brickwork
 - Formwork
 - Plastering and painting
 - b. Water supply and sanitary work
 - Earth work in excavation in trench
 - Supplying and laying of different types of pipes (RCC, GI, and CI)

Unit: 5 Detailed Estimates **(10 hrs)**

- 5.5 Estimates of single storey residential building
- 5.6 Estimate of signal tower/ Transmission line and monuments
- 5.7 Estimates of septic tank and soak pit.

Test and revision **(15hrs)**

Quantity Surveying Practical **(30 hours)**

Application of units (1 to 5) in preparation detail estimate

1. Understanding technical drawings of various engineering structures
2. Estimate of one room building with RCC flat roof
3. Estimate of retaining wall

4. Estimation of signal tower and monuments
5. Septic tank and soak pit
6. Biogas plants

Reference Books

1. *Amarjit, Aggarwal "Civil Engineering quantity surveying and valuation", Kaston Publishing house Ludhiana, 1985.*
2. *M. Chakrawarti "Estimating costing and specification".*
3. *B.N. Dutta "Estimating and Costing".*
4. *Seymour Berger and Jules B. Godel, "Estimating and project management for small construction firms". Van Nostradn Reinhold Publishing Co. New work.*

GIS Applications EG3205GE

Year: III
Semester: II

Total: hour /week
Lecture: hours/week
Tutorial: hours/week

Course Description:

The primary objective of this course is to impart the knowledge of GIS applications as a planning tool.. The course focuses simple GIS analysis and visualization. The courses aim to introduce various applications of GIS in spatial planning and decision making process.

Course Objectives:

After the completion of this course, students will be able to:

- 1. Perform simple GIS analysis*
- 2. Understand maps data types and use of proper visual variables*
- 3. Visualize different types of data in forms of maps*
- 4. Conceptualize GIS as a decision support tool*
- 5. Understand the basic application of GIS in spatial planning*

Course Contents:

Unit: 1 Data Integration

- 4.21 Join and relate spatial and attribute data
- 4.22** Projection and transformation *of spatial data*

Unit 2: Spatial Analysis

[10 hrs]

2.1 Classification and Measurement

- 4.23 Explain measurement techniques of raster and vector data
- 4.24 Explain spatial selection queries
- 4.25 Explain Classification methods (: User control classification and automatic classification)

2.2 Overlay functions and Neighborhood Analysis

- 4.26 Explain vector overlay operation and raster overlay operation
- 4.27 Explain Neighborhood function (Generating buffer zone)

2.3 3D Analysis

- 4.28 Define 3D representation of Earth surface
- 4.29 Explain the methods for Generating contours and 3D surface from 3D points
- 4.30 Introduce followings:
 - Slope/Aspect/Hill-shade
 - Surface area and volume
 - Contour and profile generation
- 4.31 Define Digital Elevation Model (DEM) and Digital Surface Model (DSM)
- 4.32 Explain the application of Elevation Model (DEM) in spatial planning

Unit 2: Visualization

[15 hrs]

2.1 Introduction

- 4.33 Define visualization
- 4.34 Differentiate Hard copy and digital maps

2.2 Map Data Types

- 4.35 Define and differentiate Map Data Types (Qualitative and Quantitative)
- 4.36 List and describe Visual Variables
- 4.37 Understand the application of visual variables to visualize different types of map data

2.3 Types of Maps and Map design Principles

- 4.38 Differentiate Map Types from users perspective (Static, dynamic and interactive maps)
- 4.39 Explain thematic maps
- 4.40 Explain the basic rules for Map Design
- 4.41 Introduce web maps.

Unit 3: Quality and accuracy of GIS maps/ data

[5 hrs]

3.1 Data Quality

- 4.42 Define Data quality
- 4.43** Introduce the Elements of data quality
 - Spatial accuracy
 - Attribute accuracy
 - Temporal Accuracy
 - Logical Consistency
 - Lineage

3.2 Accuracy Assessment

- 4.44 Define Accuracy and precision
- 4.45 Explain Error propagation
- 4.46 Describe RMSE for assessing positional accuracy

Unit 4: GIS Project

[5 hrs]

4.1 Problem Identification

- 4.47 Define problem related to spatial planning of a case

4.2 Project Design

- 4.48 Design data models required for the project
- 4.49 List the resources required for the project
- 4.50 Discuss the possible problems
- 4.51 List out the expected project out comes

4.3 Project Implementation

4.52 Prepare the project implementation schedule

4.5 Project Evaluation

4.53 Define project Evaluation

4.54 Setting evaluation criteria

Unit 5: Test and Revision

[10 hrs]

Reference Books

1. *An Introduction to Geographical Information System - Ian Heywood, Sarah Cornelius, Steve Carver, Pearson Education, Pearson Education (Fourth Edition) 2005*
2. *Principles of Geographic Information System - Rolf A. de By (ed.) (ITC Education Text Book Series; 1)*
3. *Cartography Visualization of Geospatial Data – Menno Kraak & Ferhan Ormeling*
4. *Principles of Geographical Information System - Peter. A. Burrough and Rachael A. McDonnell*
5. *Geographical Information system and computer Cartography - Christopher S. Jones*
6. *Elements of Cartography, H. Robinson*

GIS Applications (Practical)

EG3205GE

- Unit 1: Spatial Analysis** [5 hrs+5hrs]
- 1.1 Combine data from different sources (join attribute tables, import external data into GIS)
 - 1.2 Calculate Geometry of raster and vector data
 - 1.3 Query databases
 - 1.4 Perform Geo-processing and Computation
 - 1.5 Generate Buffer Zone (point, line, Polygon buffer)
 - 1.6 Convert Vector to raster and raster to vector
- Unit 2: 3D Analysis** [5hrs+5 hrs]
- 2.1 Create TIN surface from 3D points of Features
 - 2.2 Generate DEM from different data sources (3D points, Contours)
 - 2.3 Create Counters using 3D point data and DEM
 - 2.4 Generate Slope/Aspect/Hill shade raster
 - 2.5 Calculate Surface area and volume from DEM
 - 2.6 Generate profiles
- Unit 3: Visualization and map cartography** [5 hrs+10hrs]
- 3.1 Compose maps
 - 3.2 Generalize map elements
 - 3.2 Apply Cartographic principles of map design
 - 3.3 Use appropriate Color in maps
 - 3.4 Symbolize features
 - 3.5 Place features and Geographic names
 - 3.6 Label features
 - 3.7 Insert legend north arrow, grid, scale, title, projection information, map notes
 - 3.8 Export maps in to different formats
- Unit 4: Thematic Mapping** [5hrs+10hrs]
- 4.1 Visualize themes in maps (Using Graduated Color, Graduated symbols, Proportional symbols, and dot density)
 - 4.3 Compose maps and show the thematic information using appropriate Graphs and charts

Unit 5: Project Work

[10hrs+30 hrs]

- 5.1 Project work relevant to GIS application will be assigned to the student(s) and they are required to submit their project report. Different case study will be provided to the students and they can choose a case of their interest. The project work supposed to be completed in group or individually. Student will complete project work under the minimum supervision of instructor. Relevant data and guidelines for given case study will be provided by the course instructor.
- 5.2 The project work will be based on the following cases.
- Topographic mapping
 - Digitization and map preparation
 - Terrain Modeling and 3D analysis
 - Land planning/ plotting and mapping
 - Thematic mapping
 - Suitability analysis
 - Socio-economic analysis

Engineering Survey

EG 2205GE

Year: III
Semester: II

Total: 7 hours/week
Lecture: 2 hours/week
Tutorial: 1 hours/week
Practical: 4 hours/week

Course Description:

This course focuses on theoretical and practical knowledge of surveying related to different engineering project.

Course Objectives:

After the completion of this course, students will be able to

- Understand the concept of engineering surveying
- Perform the surveying related to different construction project

Course Contents:

Unit 1.	Introduction to Engineering Survey	4hrs
	1.1 Survey Component in various engineering construction Projects.	
Unit 2.	Route Survey	5hrs
	2.1 Meaning and concept of routes	
	2.2 Surveying for different types of Routes (Road, Irrigation, Water Supply, Transmission line etc)	
	2.3 Plan, Profile, cross section	
Unit 3.	Curve	10hrs
	3.1 Introduction and classification of curve	
	3.2 Designation of Curve	
	3.3 Elements of Simple Circular curve	
	3.4 Setting out Simple circular curve by :	
	4.55 Method of offset from long chord	
	4.56 method of offset from Tangent	
	4.57 Rankin's Method of deflection angle	
	3.5 Vertical curve	
	3.6 Concept of transition curve.	
Unit 4.	Area and Volume	10hrs
	4.1 Area of different geometrical figures	
	4.2 Area measurement of Irregular figure	
	4.58 Average ordinate method	
	4.59 Trapezoid method	
	4.60 Simpson's method	
	4.3 Area measurement by coordinates	
	4.4 Area determination by graphical method (on the map)	
	4.61 By square grids	
	4.62 By planimeter	

- 4.5 Volume of different geometrical shapes (Cube, Paralloiped, sphere, cylinder, and Cone)
- 4.6 Determination of volume by:
 - 4.63 Area of cross section method (one level section)
 - 4.64 Spot heights
 - 4.65 Contour maps
- 4.7 Mass haul

Unit 5. Site Survey

5hrs

- 2.4 Introduction
- 2.5 Site Survey for different purposes
- 2.6 Site survey for Building, Bridge, Dam, Power House etc.
- 2.7 Methods of site survey
- 2.8 Establishment of control points and Bench Marks.
- 2.9 Computation and Plotting field data
- 2.10 Preparation of plans and profiles for different component of construction site
- 2.11 Transfer of the map data on the ground

Unit 6. Hydrographic Survey

5hrs

- 6.1 Introduction
- 6.2 Sounding (different instrument used in surveying)
- 6.3 Sounding measurement by direct and indirect methods.
- 6.4 Measurement of the Velocity of the river by float method and current water
- 6.5 Measurement of Discharge by Area of cross section method
- 6.6 Methods of locating the soundings.

Test and Revision

6hrs

References

- 4. Surveying Vol. II, Dr. B.C Punmia, A.K Jain, Laxmi Publication Pvt. Ltd. New Delhi
- 5. Surveying Vol. I , S. K Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi
- 6. Fundamental of Surveying, S.K Roy, Prentice –Hall of India, New Delhi

Engineering Survey - Practical

Unit 1.	Indoor	(10hrs+15hrs)
1.1	Computation of existing field data for engineering surveys	
1.2	Plotting of existing data	
1.3	Preparation of Plans and Profiles	
1.4	Earth work estimation	
Unit 2.	Outdoor	(15hrs+20hrs)
2.1	Route Survey (Road alignment, Geometric design)	
2.2	Bridge site Survey	
2.3	Setting out simple circular curves by Tape and theodolite	
2.4	Discharge measurement of a river (float and current water)	

Project Work EG 3206GE

Year: III
Semester: II

Total: 8 hour /week
Lecture: hours/week
Tutorial: hours/week
Practical: 8 hours/week

Course Description:

In the end of the course students shall be given a project work related to one subject area for which they will employ their knowledge and skills in planning, executing and evaluating of project. Basic theoretical concept about project design, planning, implementation, evaluation and reporting will be provided at the outset of the project. The students shall carry out the project task on the basis of their acquired knowledge and skill in the field of Geomatics.

Course Objectives:

The objective of the project work is to employ the student's knowledge and skills in real work situation. After completing the project work, students will able to

1. *Design a Project Work and develop project proposal*
2. *Planning survey project and estimate the resources required*
3. *Execute the survey project on specified area*
4. *Evaluate the project outcomes*
5. *Prepare the project reports and to present the project outcomes*

Project Work:

7. The Project work will be based on any one of the following themes/topics
8. Development of proposal, Data acquisition, reporting part of the project work will be carried out by a group of specified number of students. Individual member of the group are required to submit their own performance on Computation/ data analysis, and mapping etc.

Topic 1. Bridge site Survey

Students will be required to carry out the bridge site surveying and for this student(s) will conduct field survey for data capture. Students will prepare the maps, profile, graphs and relevant out-put using field survey data. Available instruments in the institute shall have to be used.

Topic 2. Route survey

Students will be required to carry out the route surveying of specified feature and for this they will conduct field survey for data capture. Students will prepare the maps, profile, graphs and relevant out-put using field survey data. Available instruments in the institute shall have to be used.

Topic 4. Topographical Surveying

Students will be required to carry out the topographical survey of specified area. For this they will conduct field survey for data capture. Students will prepare the topographical maps using field survey data. . Available instruments in the institute shall have to be used.

Topic 5. Cadastral Surveying

Students will be required to carry out the cadastral survey of specified area and for this they will conduct field survey for data capture. Students will prepare the cadastral maps,

other cadastral records using field survey data. . Available instruments in the institute shall have to be used.

Topic 6. *Map Digitization and updating through field verification*

A hard copy of map section will be provided and the student will prepare the digital databases from the existing map and update the major changes using field surveying data.

Topic 7. *Resource mapping*

Digital Base map will be provided and the student will carry out the GPS surveying using hand held GPS and prepare the databases and maps showing the location of resources

Topic 8. *Thematic Mapping*

Digital Base map of study area will be provided and the student will obtain the relevant thematic information/data using primary or secondary sources. Students will tabulate, manage and analyze the data and they will visualize their analysis in different thematic maps, charts and tables. The analysis should link with spatial context of the selected theme. The study can be focused on one or more of the following themes.

- 4.66 Population, Population density
- 4.67 Poverty
- 4.68 Facilities and accessibility in the resources
- 4.69 Education status
- 4.70 Employment and economic condition
- 4.71 Gender issues and domestic conflict etc.

Evaluation of Project work:

The evaluation of the project work will be based on the project proposal, final project report, presentation and viva.

References:

1. *Project Reports of different engineering projects*
2. *Technical Writing Process and Product - Sharon J. Gerson/ Steven M. Gerson, Pearson Education Asia.*