

Faculty of **E**ducation

Master of Education (M.Ed.)

in

Mathematics Education

Curriculum

1999



Curriculum Development Centre

Tribhuvan University

Kirtipur, Kathmandu

Nepal

Faculty of Education

Master of Education (M.Ed.) in Mathematics Education *Curriculum* 1999



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Master of Education (M.Ed.)

Mathematics Education

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Kathmandu, Nepal

Tribhuvan University
Faculty of Education
Master of Education (M.Ed) Programme

Education has a key role in national development. The extent to which education will be able to support the process of national development depends on the academic and professional strengths of educational planners, managers, teacher educators, headmasters and teachers. As the demand for quality schooling and higher education rises, the need for competent professionals becomes even greater. To meet this need the Faculty of Education (FOE), Tribhuvan University with its two-year Master programme is committed to providing better and qualified teachers, teacher educators, educational administrators and planners, system analysts and experts in the field of education.

The FOE has introduced three-year B.ED. programme since 1996 with the curriculum focused on meeting varying social needs. This necessitated restructuring the M.Ed. curriculum so to make it consonant with the newly developed B.ED. programme. All in all, this change has been prompted by the visions and the experiences of teacher educators and other professionals working in the field of education all these years.

I. Programme Objectives

The overall objective of the M.Ed. program is to produce higher level manpower in the field of education. More specifically, the main objectives are :

- to develop leadership manpower in the field of education;
- to produce better qualified and competent teacher educators;
- to produce efficient educational planners, administrators and supervisors and other educational experts;
- to promote innovative practices in the field of education; and
- to produce better trained teachers especially at the higher level.

II. Curriculum Structure

The curriculum structure for this programme consists mainly of the core and specialization areas. The weightage and full marks given to these areas are as follows:

Areas	Weightage	Full Marks
a. Core Courses	30%	300
b. Specialization	65%	650
c. Elective	5%	50
Total	100%	1000

a. *The core courses consist of the following:*

<u>Courses</u>	<u>Full Marks</u>
i. Foundations of Education	100
ii. Psychology in the Classroom	50
iii. Curriculum Planning and Practices	50
iv. Measurement and Evaluation in Education	50
v. Research Methodology	50
Total	300

b. *Each specialization subject covers the following areas:*

<u>Areas</u>	<u>Full Marks</u>
i. Content Courses	350-450
ii. Pedagogical Courses	100-200
iii. Practicum	50
iv. Thesis	50
Total	650

Students can specialize in any one of the following subjects provided that they have basic background knowledge in that subject:

- i Curriculum and Evaluation
- ii Educational Planning and Management
- iii English Education
- iv Nepali Education
- v Science Education
- vi Health Education
- vii Physical Education
- viii Geography Education
- ix Economics Education
- x History Education
- xi Political Science Education
- xii Mathematics Education

In addition to specializing in any one of these subjects, the students of this program are required to conduct independent research work and participate in teaching and its related activities (practicum). Both the thesis writing and practicum have to be related to the specialization subject of the student.

III. Course Cycle

Area	First Year	Full Marks	Second Year	Full Marks
Core area	Core Courses	200	Core Courses	100
	i. Foundation of Education	100	i. Measurement and Evaluation in education	50
	ii. Psychology in the classroom	50	ii. Research Methodology	50
	iii. Curriculum Planning and Practices	50		
Specialization	As approved by concerned subject committee	300	As approved by concerned subject committee	350
Elective			As approved by concerned subject committee/dept.	50
Total		500		500

IV. Instructional Days

Generally an academic year will consist of 150 teaching days excluding the days taken by admission and annual examination. A theory paper of 100 marks will generally carry 150 lectures and 5 periods a week and a paper of 50 marks, 75 lectures and 3 periods a week. A practical course of 50 marks requires the students to attend 4 periods per week. Each lecture must be of 55 minutes, duration.

V. Method of Instruction

The method of teaching in the M.Ed. programme will be a combination of several approaches. Class lecture, group discussion, demonstrations, guest lectures, seminar, term paper presentation, case analysis, problem solving, practical experiences and fieldwork approaches will be used as different techniques of giving instruction in the courses so that students will be able to develop abilities for self learning, problem solving and critical thinking.

VI. Eligibility for Admission

A graduate with B.Ed. degree either one year, two year or three year from Tribhuvan University or a university recognized by Tribhuvan University will be eligible to apply for admission to the two year M.Ed. programme.

VII. Admission Criteria

An applicant seeking admission to the M.Ed. programme must appear in the Entrance Test (ET) of two hour's duration conducted by the FOE. The ET questions will be related to general education, educational aptitude and the subject of specialization. Fifty percent weightage will be given to education-related areas and the remaining fifty percent weightage will be given to specialization subject. A merit list of the applicants will be prepared by adding the percentage of marks they have obtained in their previous qualification for application with the marks scored by them in ET. An applicant who fails to

obtain a minimum qualifying score of 35 percent will not be eligible for admission. Admission of candidates will be based on the merit list and the intake capacity of the Central Department/Campuses. Each student will have to appear in the year-ending examination of all the courses offered in the first year to be eligible for enrolment in the second year.

VIII. Thesis Writing and Evaluation

Thesis writing within the specialization area is compulsory. **Only those students who have passed all the courses of the first year programme will be allowed to undertake thesis writing.** The thesis has to be written under the direct supervision of a Faculty member of the Campus/Department. The format for writing the research proposal and the procedure for approving it will be as fixed by the Departmental Research Committee. The evaluation of the thesis will be based both on the written part and viva-voce. Of the total weightage given to thesis course, seventy percent weightage will be allocated to the written quality of the thesis and the remaining thirty percent will be allocated to viva-voce. Viva -voce for the thesis of the student will be conducted only after passing all the courses offered in the second year of M.Ed.

IX. Practicum

The practicum is an integral part of the M.Ed. programme. It is designed to provide opportunities to students to actually participate in the activities of the campus or of higher secondary school level. Each student is required to complete three activities - classroom teaching, internship and curriculum evaluation in their specialization subject. However, students specializing in Educational Planning and Management are required to undertake other activities in place of classroom teaching. This practicum course is carried out within or after the second year of the programme for six weeks. **Students who have passed all the courses offered to them in the first year can participate in this course.**

X. Attendance and Evaluation System

- Minimum attendance (i.e. 70p. c.) in accordance with the University regulation is required in each subject in order to be eligible for the annual examinations (i.e. 70 percent).
- Controller of Examination, T.U., will conduct the annual examinations at the end of each academic session. Each student must appear in and pass all those examinations in order to qualify for M.Ed. degree.
- The evaluation procedures for practical courses will be as specified by the subject committees.
- The minimum pass marks for the theory paper is 40 percent and for the practicum, 50 percent.

XI. Grading System

The grading system will be as follows:

Third Division:	40% and above
Second Division	50% and above
First Division	60% and above
Distinction	75% and above

XII. Graduation Requirements

The M.Ed. programme extends over two academic years. M.Ed. degree is awarded on its successful completion. All the candidates for M.Ed. degree must fulfill the following requirements:

- The successful completion of 1000 marks as prescribed with the passing grades in all the courses.
- Completion of courses for the fulfillment of this programme must occur within the time frame prescribed by T.U.

Educational Core Courses

First Year

Course No.	Course Title	F. M	Year	Nature
Ed. Psy. 501	Foundations of Education	100	I	Theoretical
Ed. Psy. 502	Psychology in the Classroom	50	I	Theoretical
Ed. 503	Curriculum Planning and Practices	50	I	Theoretical

Second Year

Ed. 504	Research Methodology	50	II	Theoretical
Ed. Psy. 505	Measurement and Evaluation in Education	50	II	Theoretical

Foundations of Education

Course No.: Ed. 501

Nature of the course: Theoretical

Year: First

Full Marks: 100

Pass Marks: 40

Periods per week: 5

Course Description

This is a compulsory course designed for the students of Master Degree in Education. It intends to develop a comprehensive theoretical knowledge and understanding related to the philosophy, history and sociology of education. It also deals with the education system in selected countries of the world.

General Objectives

The general objectives of this course are (a) to assist the students in developing a philosophical base of education, (b) to explore the use of sociological knowledge in education, and (c) to acquaint the students with the basics of education in various countries.

Specific Objectives

- Explain the meaning, uses and functions of philosophy.
- Explain progressivism and existentialism and their contributions in education.
- Discuss the concepts of reality, nature of knowledge, values system and their implications in education of Hindu and Buddhist Philosophy.
- Explain the Origin, Nature and Structure of the Sociology of Education.
- Analyse the Theories of Social Stratification in Education.
- Describe the perspective of Social Mobility in Education.
- Explain the factors of cultural reproduction and the process of transmission of knowledge.
- Describe the process of social transformation in Education.
- Explain the political role in Education.
- Describe major educational systems of the Ancient, Medieval and Modern periods.
- Explain the structure of education in the context of selected countries.
- Identify the national goals of education in different countries.
- Study and explore the subject areas taught in the primary and secondary levels including their major focus.
- Explore the evaluation systems of different countries, and make a comparative analysis.
- Describe the administrative structure of education at the central, district and local levels.
- Analyze the provision of teacher education in selected countries.

Course Contents

Part I: Philosophical Foundation

- Unit I Introduction to Philosophy** **6 hrs.**
- Approaches to study philosophy
 - Philosophy and Education
 - Uses of philosophy
 - Fields of philosophy (Metaphysics, Epistemology, Axiology, Logic)
 - Functions of Philosophy (Descriptive, Speculative, Prescriptive, Analytic)
- Unit II Progressivism in Education** **6 hrs.**
- Basic principles
 - Progressivism and Education
 - Progressivism and Aims of Education
 - Progressivism and Curriculum
 - Progressivism and Role of the Teacher, School and Students.
- Unit III Existentialism in Education** **6 hrs.**
- Existentialism and Education
 - Existentialism and Aims of Education
 - Existentialism and Curriculum
 - Existentialism and Role of the Teacher, Student and School
- Unit IV Hindu and Buddhist Philosophy** **7 hrs.**
- Views of Hindu Philosophy**
- Concept of Reality
 - Nature of Knowledge
 - Value system
- Views of Buddhist philosophy**
- Concept of Reality
 - Nature of Knowledge
 - Value system
 - Implications of their views in Education

Part II Sociological Foundation

- Unit V The Origin, Nature and Structure of the Sociological Foundation of Education** **6 hrs.**
- Origin and development stage
 - Educational Sociology and the Sociology of Education (concept, differences and functions)
 - The content and the scope of the Sociology of Education.

- Theory and methodology related to the Sociology of Education (The nature of theory, Major theoretical orientation: Structural - Functionalism, conflict Theory, Symbolic Interactions and Contradiction Theory of Marx)

Unit VI Theories of Social Stratification **6 hrs.**

- Social Stratification: five basic characteristics (Ancient, Ubiquitous, The social patterning, the diversity of form, amount and the consequences)
- Thought and theory of stratification (consensus vs conflict theories)
- The shape of stratification (classes and status groups, continuous versus discrete variables, objective versus criteria, the reputation approach)

Unit VII Education and Social Selection **6 hrs.**

- The nature of Social Mobility (concept, measures and trends)
- Socio-economic status; intelligence and the attainment of higher education.
- Educational Factor and Social Mobility

Unit VIII Social Transformation and Education **6 hrs.**

- Social policy and Education (concept, need and impact)
- Educational opportunity and equity.
- The problems of the economics of education.
- Changes-place in society (evolutionary theory, cyclic theory and conflict theory)
- Changing process in the context of Nepalese society.

Unit IX The Politics of Education **7 hrs.**

- The nature of power (force, authority, and democratic representative)
- The distribution and use of power (structure approach, the power elite approach, the pluralist approach)
 - Characteristics
 - Nature of Society
 - Social Changes
 - Social Mobility
- The role of the state in Education (power, functions, order, and rules and regulations)
- The teacher and the student movement (concept, organizational structure and the role)

Unit X Education and Culture **5 hrs.**

- Concept of Culture (pattern and functions)
- Relation between Education and Culture
- The process of Cultural Transmission

- comparatively explain the social justice approaches in education

Unit XI Education and Social Justice **5 hrs.**

- Approaches to Social justice
 - International Conventions: - Human Right, Child Rights, Labourers' Rights, Women's Rights.
 - National Legislative Provisions: - Human Right, Child Rights, Labourers' Rights, Women's Rights.
- Marginalized and Disadvantaged Population
- Approaches to Promote Social Justice in the Society
 - Education
 - Legislative provision
 - Advocacy for Social Justice
 - Rehabilitation program

Part III Historical Foundations of Education

Unit XII Historical Background of the Education System **7 hrs.**

- Bird's Eye- view
 - Ancient Education system in the west - Greek & Roman Education
 - Ancient Education system in the East-Hindu and Buddhist Education.
 - Education during the Medieval period
 - Development of Education in Nepal from Ancient to Modern periods.

Unit XIII Major Educational Movements Leading to the Development of Education in the Modern Period **7 hrs.**

- Basic Needs Approaches in Education
- Movement from Selective to Mass Education
- Movement from Religion to Nationalism
- Movement from Authoritarian to Democratic Education
- Human Rights Movement
 - Right to education
 - Gender equality
 - Peace education

Part IV Education System of Nepal, India, China, USA, Russia and Japan

Unit I Bases of Education of Above mentioned Countries **20 hrs.**

- National Goals
- Cultural factors
- Social factors
- Religious factors
- Geographical factors

- National economic factors
- Political system factor

Unit XV Structure and Levelwise Goals of Education of Above Mentined Countries 30 hrs.

- Pre-primary Education
- Primary Education
- Secondary
- Higher secondary
- Higher Education
- Teacher Education

Unit XVI Problems of Education Systems Interrelation of Education of Above Mentined Countries 20 hrs.

- Curriculum organization
- Examination system
- Student of admission
- Financing education

Instructional Techniques

- Lecture
- Discussion
- Assignments
- Presentations
- However, the following techniques may be useful for the study of the Education Systems in selected countries.
- Have the students study the materials provided by the teacher.
- The contents should be dealt with in a comparative form, not on an individual basis
- Comparative charts of each of the said contents should be developed, both by the teachers (for a model) and students in groups.
- Presentation of comparison (at least two countries) from each group is expected

Evaluation Technique

Final examination at the end of the academic year

External Examination 100%

Textbooks and References

- Allan C, Ornstein and David V, Levine, (1989), **Foundations of Education**, Houghton Mifflin Company, Boston, USA
- Boyd, William (1957), **History of Western Education**, London, Adam and Charts Black.
- Butler, **Four Philosophies and their practice in Education and Religion**, Harper & Row Publication.
- Chanube SP and Chanbe A (1994) **Foundations of Education** New Delhi: Vikas Publishing House.

- Dandekar, **Psychological Foundations in Education** Macmillan India Limited.
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- George L.F. Bereday, (1967) **Comparative Method in Education**, Oxford and IBS Publishing Company Calcutta, India.
- Haralambos, Michael and Holborn, Martin (1995) **Sociology: Themes and Perspectives**. London: Collins Educational
- Hans, Nicholas, **Comparative Education**, Routledge and Kegan Paul Ltd. London.
- Kneller, George F (1964). **Introduction to the Philosophy of Education**. New York: Johnwiley & Sons.
- Mukherjee, **Comparative Education** Kitab Mahal, Pvt. Ltd., Allahabad, India.
- Morris, Ivor (1976). **The Sociology of Education: An Introduction**. London: George Allen & UNwin Ltd.
- Tumin, Melvin. M., (1982), **Social stratification** Prentice Hall of India.
- Thakur, A.S., (1977), **The Philosophical Foundations of Education**, National, New Delhi.
- Wagley M. & Karki, H. (1998), **Different Foundations of Education**, Bidhyarthi Publications, Kathmandu.

Psychology in the Classroom

Course No.: Ed. Psy. 502

Full Marks: 50

Nature of the course: Theoretical

Pass Marks: 20

Year: First

Periods per week: 3

Course Description

This is an educational psychology course focussing upon the theories and principles of human development, learning and guidance in education. It briefly deals also with the concept and causes of the different types of developmental deviations and their remedial measures.

General Objectives

The main objective of this course is to familiarise and orient the students with the different approaches to human development, learning theories, principles of guidance and the concept of developmental deviations so as to enable them to draw implications for teaching and education.

Specific Objectives

- Identify the stages of human development and their major characteristics.
- Explain the physical, mental and emotional characteristics of the adolescent and their implications in education.
- Compare the characteristics of the Nepalese adolescent with those of the west.
- Identify major factors involved in human development and their implications in education.
- Be familiar with different approaches to human development and their educational implications.
- Be acquainted with deviations and their remedial measures.
- Define guidance and counseling.
- Identify the areas of guidance.
- Explain the inter-relationship between guidance and education.
- Identify the needs of guidance in schools.
- Discuss the status of guidance services in Nepal today.
- Identify major theories of learning.
- Distinguish between behaviouristic and cognitive approaches to learning.
- Discuss the implications of each of the major behaviouristics and cognitive theories of learning.
- Explain the psychological base of some models of teaching
- Familiarise themselves with the nature of experiments done in learning.

Course Contents

- Unit I Nature and Stages of Human Development** **2 hrs.**
- A review of the different stages of human development and their major characteristics.
 - Concept of developmental norms and status of the normative studies in Nepal.
- Unit II Domains of Human Development** **3 hrs.**
- A review of physical, mental and emotional characteristics of adolescence and their educational implications.
 - The Nepalese adolescent vis-avis the adolescent in the west.
- Unit III Major Factors Influencing Human Development** **4 hrs.**
- Genetic and sex-related factors.
 - Socio-economic and educational factors.
 - Eco-cultural factors.
- Unit IV Theories of Human development** **8 hrs.**
- Major Issues in Human Development
 - Nature Vs Nurture
 - Universal Vs Culture Specific.
 - Maturation Vs Learning
 - Major Approaches to Human development
 - Behaviouristics Approach: Skinner's view
 - Psychoanalytic Approach: Freud's view
 - Humanistic Approach: Maslow's view
 - Cognitive Approach: Piaget's view
- Unit V Developmental Deviation: A General Survey** **13 hrs.**
- Nature and Types
 - Mental Retardation: symptoms and causes
 - Sexual Perversions: sex diseases and perversions
 - Behavioural Disorders: delinquency and psycho-sociopaths
 - The Drug Abusers
 - The economically and culturally deprived children.
 - Remedial Measures
 - Medical Measures
 - Institutionalization and Family Rehabilitation.
 - Special Education Programs: headstart program and education for the out-of school children.
 - Psychotherapies.
 - Practical: Case studies of the deviated.
- Unit VI Orientation to Guidance** **3 hrs.**
- Guidance Program (Preventive Measures)
 - Meaning of guidance

- Guidance and education
- Purpose of guidance
- Role of teachers and parents in guidance

Unit VII Scope and Functions of Guidance

6 hrs.

- Process and Functions of Guidance
 - Understand the individual and his/her environment.
 - Help the individual develop his/her potentialities.
 - Enable him/her to solve life problems and live a happy life.
- Types of Guidance
 - Educational Guidance
 - Personal Guidance
- Guidance Services
 - Inventory Service
 - Information Service
 - Counselling Service
 - Placement Service
 - Follow-up and Research

Unit VIII Counselling

6 hrs.

- The Concept
 - Meaning of Counselling
 - Relation of Counselling
 - Purpose and functions of counselling and the counselor.
- Types of Counselling
 - Diagnostic Counselling
 - Therapeutic Counselling
 - Directive and non-directive approaches to counselling.
- Techniques of Counselling
 - Individual Counselling
 - Group Counselling

Unit IX Introduction to the Theories of Learning

7 hrs.

- Major issues in psychology of learning
 - Process and mechanism of learning
 - Role of practice, reward and punishment, and understanding in learning.
- Introduction to the behaviouristic and cognitive theories of learning and their distinctive features.

Unit X Behaviouristic Theories

1 Pavlovian Conditioning

7 hrs..

- Principles and Applications
 - Acquisition of Conditioned Response (CR): The Pavlovian conditioning procedure,
 - Application of Pavlovian conditioning in

- * Habit formation,
- * Fear and other emotional conditioning,
- * Verbal learning
- * Sensitization
- Different Types of Conditioning
 - Aversive and escape conditioning
 - Vicarious conditioning
- Application of different forms of conditioning in acquiring and changing behaviour.
- Extinction of CR.
 - The extinction or unconditioning process.
 - The nature and type of inhibition process.
 - The phenomenon of spontaneous recovery and its implication.
 - Application of unconditioning in desensitization and emotional control.
- Contribution of Pavlov to the development of the theory and practice of learning.
- Practical demonstration of a simple Pavlovian conditioning experiment in the class or in Psychology lab.

2 Skinnerian Operant Conditioning

6 hrs.

- Acquisition of operant response: The technique of operant conditioning.
- Role of reinforcement in operant conditioning
 - Nature of reinforcement: Skinner's view,
 - Types of reinforcement
- * Primary and secondary reinforcement.
- * Positive and negative reinforcement.
 - Schedule of reinforcement.
- * Fixed-variable
- * Interval-ratio
- * Differential schedule
 - Impact of different schedules of reinforcement on operant behaviour.
- Application of operant conditioning in
 - Personnel management; group contingency management
 - Behaviour therapy
 - Verbal learning
 - Programmed instruction
 - Use of token economy.
 - Group Contingency
- Practical: The teacher demonstrates a simple experiment to show the effect of reinforcement and non-reinforcement on learning and teaching.

3 Thorndike's Connectionism

3 hrs.

- Thorndike's Trial and Error Process of Learning
- Application of Trial and Error in skill learning.
- Thorndike's Laws of Learning
- Applications of the primary laws of learning in teaching.
- Practical: Demonstrate the role of practice on learning verbal or motor skill.

Unit XI Cognitive Approaches to Learning

6 hrs.

- The information processing theory of learning
- Contribution of
 - Tolman's place learning, latent learning and expectancy learning experiments.
 - Wertheimer's productive thinking
 - Kohler's insight learning
 - Piaget's cognitive development to the development of cognitive theory of learning.
- Applications of information processing in
 - Memory
 - Concept and principle learning
 - Problem solving and creative thinking

Unit XII Models of Teaching

6 hrs.

- The Basic Teaching Model
- The Teacher Centred Teaching Models: the lecture, recitation and classical technological models of teaching.
- Child-centred Teaching Model: the progressive teaching and systems.
- Interactional Teaching Model: The constructivists' model.
- Model Planning from the students

Instructional Techniques

- Lecture-cum-discussion
- Group discussion
- Library work and
- Individual activity

Evaluation Technique

Final examination at the end of the academic year

External Examination 100 %

Instructional Materials

Main texts

- Bernard, Harold W. and Fullmer, Daniel W. 1977, **Principles of Guidance**. Thomas Y. Crowell Company.
- Begee, Morris L. 1976, **Learning Theoris for Teachers**. Harper & Row.
- Bhatia, **Textbook of Educational Psychology** Macmillan India Limited.
- Beggi, Morri, L. and Hunt, Maurice P. 1968, **Psychological Foundations of Education Harper and Row**, New York.
- Craig, Grace J. **Human Development**. Prentice Hall 1989.
- DeCecco, John P. and Crawford, 1977, W. **The Psychology of Learning and Instruction**. Prentice Hall of India.
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- Hulse, S.H.; Desse, James; and Egeth, H. 1975, **The Psychology of Learning**. Mcgraw-Hill Kogakusha, Ltd.
- ✓ Hurlock, Elizabeth B. **Developmental Psychology**. Mc Graw-Hill Kugakusha. Latest-Edition.
- Jones, Arthur J; Steffellerre, Buffered; and Steward, Normal R. 1977, **Perinciples of Guidance**. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
- ✓ Klein, Steaphen B. 1996, **Learning: Principles and Applications**. Mc Graw - Hill International Edition.
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- Van Hoose, William H.; and Pietrofesa, john J. (Eds.) 1970, **Connseling and Guidance in the Twenticth Centure**. Houghton Miffin Company.

Curriculum Planning and Practices

Course No.: Ed.503

Nature of the course: Theoretical

Year: First

Full Marks: 50

Pass Marks: 20

Periods per week: 3

Course Description

This is a compulsory course on curriculum designed for the students of Master Degree in Education. This course deals with the concept of curriculum and its development procedures, the patterns of organization as well as the issues and challenges in its development. The course aims at acquainting the students with the theoretical base of the existing practices in curriculum planning and development.

General Objective

To acquaint the students with the theoretical bases of the existing practices in curriculum planning and development.

Specific Objective

- Explore the meaning of curriculum in different perspectives.
- Explain the process of curriculum development.
- Discuss the systemic view of curriculum.
- Explore different issues in curriculum
- Identify emerging challenges in curriculum development.
- Appraise different patterns of curriculum organisation.

Course Contents

Unit I Changing Concept of Curriculum

8 pds.

- a. Curriculum as syllabus / subject matter / courses of study.
- b. Curriculum as a plan for instruction
- c. Curriculum as an organization of educational process.

Unit II Steps of Curriculum Development

8 pds.

- a. Objectives
- b. Contents
- c. Methods / strategies
- d. Evaluation

Unit III Patterns of Curriculum Organization (To address specific issues)

10 pds.

- a. Activity-based curriculum
- b. Broadfield Curriculum
- c. Curriculum based on life situation (intergrated curriculum)
- d. Core Curriculum

Unit IV A Systemic View of Curriculum

22 pds.

- a. Curriculum Inputs
 - Operant
 - * Contents
 - * Materials
 - * Facilities
 - Operator
 - * Teachers
 - * Students
 - * Administrative personnel
- b. Curriculum Process
 - Teaching Learning Process
 - Time and Task
 - Activities
- c. Curriculum Output
 - Student Achievement
 - Institutional Development
 - Cost-effectiveness
 - External Efficiency

Unit V Issues in Curriculum

12 pds.

- a. Relevance to life (Does education help the learner to solve his daily problems of life ? Does education help the learner to become a good member of society?)
- b. Medium of instruction
- c. integration of courses
- d. monolithic vs diversities of course.

Unit VI Emerging Challenges in Curriculum Development

15 pds.

- a. Impact of Science and Technology on Social life and Curriculum Plan.
- b. Behavioural Problems (Social evils)
- c. Impact of drugs, alcohol, sex problems, aculturation and deculturation of society.
- d. Student migration out for education.

Instructional Techniques

- Lecture
- Discussion
- Term paper writing

Evaluation Technique

Final examination at the end of the year
External Examination 100%

Textbooks

- Taba, Hilda: 1962, **Curriculum Development: Theory and Practice**. Harcourt Brace World Inc. New York,
- Samuel A. Krik. **Educating Exceptional Children**,
- Alexander, W.M. & Saylov, J.G. (1974), **Curriculum Planning for School**, Holt, Rinehard and Winston, Inc.

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- **Curriculum of Different Levels of Schooling.**
- Hayman, R.T. (1973) ; **Approaches in Curriculum**, Prentice Hall.
- **Report of Various Commissions on Education in Nepal.**
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- Print, Marray (1993) **Curriculum Development and Design**, Allen & Unwin.
- Tyler, R.W., (1974), **Basic Principles of Curriculum and Instruction** Open University Publication, London
- Tanner, D., and Tanner., L. (1980), **Curriculum Development Theory into Practice.**
- Zais, R.S., (1976), **Curriculum Principles and Foundations**, Harper and Row Publication London,

Research Methodology

Course No.: Ed. 504

Nature of the course: Theoretical

Year: Second

Full Marks: 50

Pass Marks: 20

Period per week: 3

Course Description

This course on Research and Evaluation in Education is designed to acquaint the students with and to enable them to conduct evaluation and research studies on education. The course will plan, write proposal, construct and administer tools and analyse the results. At the end of the course the students will be required to submit a research proposal.

Course Objectives

- Discuss the concept and the purpose of educational research.
- Explain the purpose and methods of sampling
- State different types of research designs and their use.
- Explain the uses and importance of different kinds of methods and tools in research and evaluation.
- Analyze and present the data in different forms.
- Develop a research proposal on any educational topic.
- State basic concepts and use of statistics in education.
- Use basic statistics for research and other purposes.
- Analyse and interpret statistical data

Course Contents

Unit I Concept of Research

6 hrs.

- a. Definition and purpose of research in Education.
- b. Quantitative and qualitative research.
- c. Statement of problems and hypothesis.
- d. Measurement: Scales, reliability, validity
- e. Sampling:
 - Random sampling,
 - Stratified sampling,
 - Purposeful sampling,
 - Sampling size

Unit II Research Designs

6 hrs.

- a. Factors jeopardizing internal and external validity
- b. Pre-experimental designs
 - The one shot case study
 - The one group pretest post test
 - The static group comparison
- c. Experimental designs

- The pre-test-post test control group
 - The post test only control group
- d. Quasi-experimental designs
- The time-series experiment
 - Time equivalent time-samples
 - The non equivalent control group
 - Ex post facto

Unit III Methods and Tools of Data Collection 6 hrs.

- a. Interview schedule
- b. Observation
- c. Tests: types and uses.
- d. Case - study
- e. Questionnaire
- f. Checklists
- g. Opinionnaire/gallop poll.
- h. Rating scales
- i. Anecdotal records

Unit IV Introduction to Educational Statistics 5 hrs.

- a. Meaning and uses of statistics
- b. Population and sampling
- c. Variables - continuous and discrete
- d. Measurement - nominal, ordinal, interval, and ratio

Unit V Measures of Dispersion (Meaning, Purpose and Computation) 5 hrs.

- a. Range
- b. Variance
- c. Standard deviation
- d. Probability of normal distribution: normal probability, normal distribution, application of normal probability curve.

Unit VI Measure of Relative Position 5 hrs.

- a. Percentile rank
- b. Percentile score
- c. Standard score

- Unit VII Measures of Relationship / Association** **15 hrs.**
- Significance of testing differences and association: testing of significance of means, chi-square (χ^2 tests), concept of multiple regression.
 - Coefficient of correlation (r test)
 - t test
 - Analysis of variance (concept and applications)
 - Analysis of co-variance (concept only)

- Unit VIII Analysis and Presentation of Data** **5 hrs.**
- Tabulation and graphic presentation
 - Computation of percentage
 - Central Tendency (mean, median, and measures of dispersion, standard deviation)

- Unit IX Research Proposal** **15 hrs.**
- Statement of the problem
 - Significance of the problems
 - Definition, assumption, limitation and delimitation
 - Review of related literature
 - Hypothesis
 - Methods: sampling, data collection procedure (instruments/tools, manpower), data analysis and interpretation.
 - Time schedule
 - Budget

- Unit X: The Research Report** **7 hrs.**
- Executive summary
 - Introduction
 - Objectives
 - Statement of hypothesis
 - Methodology sampling plan, data collection, tools, analysis
 - Presentation: based on findings: summary, conclusion and recommendations

Instructional Techniques

- Lecture
- Assignment/term paper
- Presentation

Evaluation Technique

Final examination at the end of the year

External Examination 100%

Textbooks

1. Best, J.W. and Kahn, Jams V. (1995). **Research in Education**, New Delhi: Prentice Hall of India Private Limited
2. Kouf, Lokesh (1997). **Methodology of Educational Research**, New Delhi: Vikash Publishing House Pvt. Ltd.

References

1. APA (1974). **Publication Manual**. Washington, D.C.: American Psychological Association (Available in Dept. Library)
2. Campbell, D.T. and Stanley, J.C. (1963). **Experimental and Quasi-experimental Designs for Research**. Chicago: Rand McNally & Company.
3. Cohen, Louis and Manion, Lawrence (1994) **Research Methods in Education** London, Routledge.
4. Dewivedi, R.S. **Research Methodology in Behavioural Science**, Mac Millan of India Limited.
5. Fowler, Jr. F.J. (1987). **Survey Research Methods**. New Delhi: SAGE Publications.
6. Issac, S. and Michael, W.B. (1978). **Handbook in Research and Evaluation**. San Diego, CA :EDITS Publication.
7. Jack R. Fraenkel, Norman E. Wallen (1996), **How To Design and Evaluate Research in Education**, Mc. Graw-Hill, Inc.
8. Kerlinger, F.N. (1995) **Foundations of Behavioural Research**. New York: Holt Rensert and Winston, Inc.

Measurement and Evaluation in Education

Course No.: Ed. Psy. 505
Nature of the course: Theoretical
Year: Second

Full marks: 50
Pass Marks: 20
Periods per week: 3

Course Description

This course deals with the nature of measurement and evaluation in education along with planning, constructing, testing, scoring and analyzing the test. Measurement analysis, graphic representation of the data; and evaluation tools, techniques and approaches are given which are applicable in education. Major examples of standardized tests are oriented towards widening the students' visions. The students are required to fulfill the practical activities mentioned in this course.

General Objectives

The objective of the course is to provide knowledge and skills on educational measurement and evaluation.

Specific Objectives

- Explain the concepts of measurement and evaluation.
- Explain the need of classroom tests.
- Describe the difference between teacher made test and standardized tests.
- Develop different types of tests.
- Plan, administer, score, analyse and improve a test.
- Analyse the test statistically.
- Describe the different kinds of standardized tests and their uses.
- Plan and conduct testing program.

Course Contents

Unit I Concept of Measurement

10 hrs.

(Physical measurement and psychological measurement)

- a. Purposes of measurement
- b. Uses of measurement
- c. Scales: nominal, ordinal, interval, ratio
- d. Characteristics of Measuring Instruments
 - Reliability
 - Validity
 - Practicability
 - Comparability
 - Utility
- e. Errors of measurement and methods of minimizing errors
- f. Norm and criterion referenced measurement.

Unit II Concept of Evaluation **12 hrs.**

- a. Comprehensive Concept of Evaluation: Student Evaluation, Teacher Evaluation, Curriculum Evaluation, Program Evaluation
- b. Types of Evaluation
 - Formative
 - Summative
 - Evaluation at all levels (primary, secondary and higher education)
- c. Components of Student Evaluation
 - Social Development
 - Attitudinal Development
 - Emotional Development
 - Intellectual Development
 - Achievement/Performance
 - Co-curricular Activities

Unit III Construction of a Test **16 hrs.**

- a. Differences between Teacher-made Test and Standardized
- b. Need and Purposes of Test
- c. Planning Test
 - Why Testing
 - What to test (selection of subject matter, area)
 - How to test (written / oral, subjective, objective, practical)
 - When to test (testing schedule)
- d. Construction of Test
 - Content analysis
 - Specification Chart
 - Writing test items
 - Editing and arranging test items
 - Writing directions for test administration
 - Administering test
 - Interpretation of test results
 - Pilot study.
 - Item analysis and selection of final test items

Unit IV Standardization of a Test **11 hrs.**

- a. Item Analysis
- b. Reliability (with computation)
- c. Validity (with computation)
- d. Norms
- e. Administration of Final Test
- f. Scoring
- g. Interpretation of Test Result

Unit V Standardized Test**12 hrs.**

- a. Historical Development of Tests, Functions and Uses
- b. Intelligence test: Standford Binet, WAIS
- c. Achievement test: STEP, SAT
- d. Aptitude test: DAT, GATB
- e. Personality Inventory: MMPI
- f. Interest Inventory: Strong's and Kudir's Inventories
- g. Projective Technique: Rorchach's inh.-blot Technique

Unit VI Non- Testing Devices**6 hrs.**

- a. Observation
- b. Questionnaire
- c. Interview Schedules
- d. Opinionnaire
- e. Sociometric Test
- f. Gallop Poll

Unit VII Planning Testing Program**8 hrs.**

- a. Steps of Testing Program
- b. Purposes
- c. Organizing a test library (Question Bank)
- d. Selection of Competent Personnel
- e. Test Administration
- f. Reporting Test Results
- g. Organizing remedial measures

Practical Activities

Each students is required to undertake the following practical activities (any two):

1. Construction of a teacher-made test including preparation of specification chart, writing items, editing and arranging the items, and preparation of final format with specific directions.
2. Items analysis of achievement test including difficulty level, discrimination index, power of distractors and language of the items.
3. (a) Construction of rating scale or check list for observation; opinionnaire or questionnaire; interview schedule; sociometric test; (b) Trail test of the evaluations tools mentioned above & their improvement.
4. Development of a school testing program

Instruction Techniques

- Lecture
- Discussion
- Assignment
 - Individual work
 - Group work

Evaluation Technique

Final Examination at the end of the year

External Examination 100%

References

1. Ebel, L.R. and Frisbie, D.A. (1991) **Essentials of Educational Measurement**, Prentice Hall of India Pvt. Ltd. New Delhi.
2. Groulund , N.E., (1976), **Measurement and Evaluation in Teaching**, New York: Macnillan
3. Sing, A.K., **Measurement and Research in Behavioural Science**, McGraw Tata.
4. Thorndike, A.W. and Hagen, E. (1977) (Recent) **Measurement and Evaluation in Psychology and Education**. John Weley and Sons, Inc. New York.

Specialization

Mathematics Education

First Year

Course No.	Course Title	FM.	Nature
Math Ed. 511	Higher Geometry and Topology	100	Theoretical
Math Ed. 521	Modern Algebra	100	Theoretical
Math Ed. 531	Statistics and Operation Research	50	Theoretical
Math Ed. 541	Foundation of Mathematics Education	30+20	Theo + Prac.

Second Year

Math Ed. 551	Mathematical Analysis	100	Theoretical
Math Ed. 561	Number Theory and History of Mathematics	50	Theoretical
Math Ed. 590	Recent Trends in Mathematics Education	30+20	Theo + Prac.
Math Ed. 591	Studies in Mathematics Education	50	Practical
Ed. 598	Thesis (Math Ed.)	50	Practical
Ed. 599	Practicum (Math Ed.)	50	Practical

Elective

Math Ed. 571	Computer Science Education	20 +30 (T+P)
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Higher Geometry and Topology

Course No. : Math. Ed. 511
Nature of the course: Theoretical
Year: First

Full Marks : 100
Pass Marks : 40
Periods per week : 5

Course Description

This course deals with higher concepts of geometric configuration. It contains three parts: Differential Geometry, Projective Geometry and Topology.

The first part of the course provides basic concepts in Differential Geometry so as to enable the prospective educators to develop skills to study the essential ideas of the theory of space curves and surfaces using the theory of calculus.

The second part of the course is designed to impart knowledge about the fundamentals of Projective Geometry using modern abstract approach. It offers an advantage in using analytic geometry to illustrate synthetic ideas.

Finally, the third part of the course deals with the basic definition of Topological spaces and related topics such as connectedness, compactness, product and quotient spaces which are essential in Modern analysis.

Course Objectives

- Understand how calculus can be applied to the study of geometry
- Use calculus in defining curves and surfaces in space
- Prove theories of curves and surfaces using calculus
- Solve problems related to space curves and surfaces
- Use properties of incidence structure as axioms to develop properties of geometric structures
- Analyse mathematical structures through the use of functions
- Prove the properties of particular classes of projective planes
- Understand the conics from projective viewpoint
- Understand projective space and prove its basic properties
- Appreciate the axiomatic nature of mathematics
- Define and give examples of topological spaces
- Examine critically and prove theorems on topological spaces
- Understand and use the basic concepts of topological spaces for continuity of a function
- Define continuous functions in a more general form and apply them in different setting
- Realize the importance of connectedness and compactness in topological space and understand their basic properties especially in the case of continuity of functions
- Distinguish between metrizable and non-metrizable topological spaces
- Understand the role of compact spaces for complete metric spaces and the importance of compact spaces in case of uniform continuity

- To understand and define quotient topology and quotient space of a topological space

Course Contents

Part I: Differential Geometry

Unit I : Curves in Space

25 hrs.

Space curves, Tangent, Arc length, Osculating plane, Normal lines and Normal plane, Binormal, Rectifying plane, Orthonormal triad of fundamental Unit vectors, Fundamental planes, curvature, Torsion, Screw curvature, Curvature and torsion of a curve given by the intersection of two surfaces, Cylindrical helics and its properties, Circular helics, intrinsic equations, Fundamental theorems for space curves, Osculating circle and related properties, the osculating sphere, behaviour of a curve in the neighbourhood of a point - Involute and Evolute, Bertrand curves and their properties.

Unit II : Envelopes, Developable Surfaces and Ruled Surfaces

20 hrs.

Surface and its class, Regular point and singularities on a surface, transformation of parameter, parametric curves, Tangent plane and Normal, Family of surfaces, Envelope, its equation and their properties, Developable surfaces, Characteristic line and point, Edge of regression, Generators of the developable associated with space curves and related theorems, The central point, Ruled surface, Equation of ruled surface, Conditions for the ruled surface, Tangent plane to a ruled surface.

Unit III : Fundamental Forms and Equations

15 hrs.

First fundamental form or metric, Geometrical interpretation of metric. Properties of metric, The second fundamental form and second order magnitude, Geometrical interpretation of the second fundamental form, Weingarten equations, Direction coefficients and related results, Family of curves, Orthogonal trajectories, Double family of curves.

Part II: Projective Geometry

Unit IV : Incidence Geometry

10 hrs.

Incidence Structure, Planes, Isomorphism, Duality, Configurations and subplanes.

Unit V : Collineations

10 hrs.

Perspectivities, projectives, collineations, matrix-induced collineations on planes, central collineations on planes, Automorphic collineation on planes.

Unit VI : Desargaussian and Pappian Planes

10 hrs.

Desargaussian planes, Projectivities in Desargaussian and Pappian planes, coordinates in Desargaussian planes, Crossratio in planes.

Unit VII : Conics in Pappian Planes 10 hrs.

- The projective definition of a conic.
- Intersection of a range and a point in conic
- Conics in a Closed Plane
- Desargues's conic Theorem
- Pascal's Theorem

Unit VIII : Projective Spaces 5 hrs.

Projective spaces, Desargues Theorem, Homomorphism.

Part III: Topology

Unit IX : Topological Spaces 25 hrs.

Topological spaces, some basic terms, basis and sub-basis, continuity and topological equivalence, sub-spaces, comparison of topology, Metric topological spaces, product of topologies, finite and infinite.

Unit X : Connectedness 8 hrs.

Connected and disconnected spaces, theorems on connectedness, connected subsets of real line, application of connectedness, path connected spaces, locally connected and locally path connected spaces.

Unit XI : Compactness 7 hrs.

Compact spaces and subspaces, compactness and continuity, properties related to compactness, one-point compactification.

Unit XII : Product and Quotient Spaces 5 hrs.

Quotient spaces, surfaces and manifolds.

Evaluation Techniques

Written examination at the end of the academic session.

External examination- 100%

Textbooks

1. Gupta, P.P. and Malik G.S., (1985) **Differential Geometry**, Pragati Prakashan Meerut,.
2. Fred H. Croom, (1989), **Principles of Topology**, Holt and Rein Hart and Winston Orlando Florida.
3. Lynn E. Garner, (1981), **An Outline of Projective Geometry**, North Holland New York. Oxford.

References

1. Dembowski, P., (1968), **Finite Geometry**, New York, Springer - Verlag
2. Lal, Bansi, (1969), **Differential Geometry**, Atma Ram and Sons: Delhi,.
3. **Projective Planes**, (1973) New York Springer Verlag.
4. N.D. Gautam and Shanti Narayan: (1970), **General Topology**, S. Chand and Company India.
5. Monkers, J.R., (1998), **Topology**, Prentice Hall of India, New Delhi.
6. Richard Courant and Herbert Robbins, (1978) **What is Mathematics**, Oxford university Press.
7. Simmons, G.F., **An Introduction to Topology and Modern Analysis**, Mc. Graw Hill Book Company Newyork.
8. Willmore, T.J., **An Introduction to Differential Geometry**, Oxford University Press, Delhi.

Modern Algebra

Course No. : Math.Ed. 521
Nature of the Course : Theoretical
Year: First

Full Marks : 100
Pass Marks : 40
Periods per week : 5

Course Description

This course contains two parts: Abstract Algebra and Linear Algebra.

The first part of this course deals with the special algebraic structures in groups, rings and fields and provides theoretical rigour in Abstract Algebra.

The second part called Linear Algebra provides fundamental ideas and techniques of Linear Algebra.

Finally this course will enable the prospective educator to develop capabilities for handling concepts, facts and proving laws and principles of Modern Algebra.

Course Objective

- Compare and contrast a mathematical system and its various sub-systems with regard to their structure.
- Develop understanding of the nature, method and procedure of mathematical system.
- Prove theorems within various structures such as groups, rings and fields.
- Understand basic ideas, techniques and methods of linear algebra.
- Make clear understanding of fundamental results of linear algebra.
- Apply concepts, facts and principles in solving problems.

Course of Contents

Part I : Abstract Algebra

Unit I : Homomorphism and Normal sub-groups 9 hrs.

- Isomorphism Theorems
- Automorphism
- Conjugacy Classes

Unit II : Solvable Groups 9 hrs.

- Normal Series,
- The Jordan Holder Theorem
- Solvable Groups
- The Derived Series
- Nilpotent Groups.

Unit III : Structure Theorems of Groups 12 hrs.

- Direct Products

- Finitely Generated Abelian Groups
- Invariants of A Finite Abelian Group
- Sylow's Theorems
- Groups of Order p^2pq

Unit IV : Ideals and Ring Homomorphism

8 hrs.

- Ideals
- Homomorphisms
- Sum and Direct sum of Ideals
- Maximal and Prime Ideal.
- Nilpotent Ideals

Unit V : Unique Factorization Domains and Euclidean Domains 18 hrs.

- Integral Domain
- Unique Factorization Domain
- Principal Ideal Domain
- Polynomial Rings Over UFD.
- Ring of Fractions
- Polynomial Rings
- Polynomials over the Rational Field, Polynomial Ring over Commutative Rings.

Unit VI : Field Extension

19 hrs.

- Algebraic fields.
- Algebraically closed fields.
- Normal and separable extension
- Splitting fields
- Normal extension
- Multiple roots
- Finite fields
- Separable extensions

Part II : Linear Algebra

Unit VII : Modules and Exact Sequences

15 hrs.

- Modules, Submodules, Homomorphism and Quotient Modules, Direct Sum of Modules, Torsion Modules.
- Exact Sequences
- Free Modules
- Projective Modules
- Injective Modules

Unit VIII : Scalar Products and Orthogonality 13 hrs.
Scalar Products, Orthogonal Bases, Positive Definite Case, Bilinear Maps and Matrices, General Orthogonal Bases, the Dual Space,

Unit IX : Bilinear Forms and the Standard Forms 13 hrs.
Bilinear Forms, Quadratic Forms, Symmetric Operators, Hermitian Operators, Unitary Operators, Sylvester's Theorem,

Unit X : Polynomials and Matrices 12 hrs.
Polynomials, Polynomials of Matrices and Linear Maps

Unit XI : Triangulation of Matrices and Linear Maps 12 hrs.
Existence of Triangulation, Theorem of Hamilton-Cayley and Diagonalization of Unitary Maps

Unit XII : The Spectral Theorem 10 hrs.
Eigenvectors of Symmetric Linear Maps, The Spectral Theorem, The Unitary Operator

Evaluation

Written Examination at the end of the academic year.

External Examination- 100%

Textbooks

1. Bhattacharya, P.B., Jain, S.K., Nagpaul, S.R., **Basic Abstract Algebra**.
2. Herstien, I.N., (1971), **Topics in Algebra**. Vikas Publishing House Pvt. Ltd. New Delhi.
3. Hungerford, (1974), **Algebra**, T.W. Springer and Verlag.
4. S. Lang, (1987), **Linear Algebra**, 3rd Ed. Springer - Verlag.

References

1. Bhattacharya, P.B. and Jain, (1995), **Basic Abstract Algebra**, 2nd ed., Cambridge University Press.
2. Fraleigh, J.B., (1982), **A First Course in Abstract Algebra**, 3rd Edition, Narosa.
3. Gopalakrishnan, N.S., (1986), **University Algebra**, Wiley Eastern Limited.
4. Finkbeiner, (1978), **Introduction to Matrices and Linear Transformations**, 3rd ed., Freeman, Oxford.
5. Hungerford, T.W., **Algebra**, Springe Verlag, 2nd Edition.
6. Hoffman K. and Kunze, (1971), **Linear Algebra**, 2nd ed. Englewood cliffs.
7. Hartby B. and Hawkes T.O., (1976), **Rings and Modules and Linear Algebra**, Chapman and Hall.
8. Lipschutz, (1968), **Linear Algebra (Schaum)**, Mc Graw Hill New York.

Statistics and Operation Research

Course No. : Math. Ed. 531
Nature of the Course : Theoretical
Year: First

Full Marks : 50
Pass Marks : 20
Periods per week : 3

Course Description

This course is connected with methods and models to study situations involving uncertainties. This fascinating discipline can be presented at various levels of mathematical refinement and with various patterns of emphasis. The present course is designed with a view to striking a balance between mathematical rigour and application. The contents covered in the course are intended to equip the prospective teachers of mathematics with backgrounds and experiences indispensable to become good in the craft of teaching as well as good small time researchers.

This course also covers a wide range of the basic techniques of the different aspects of the science of Operation Research (OR). This part of OR is introductory in nature and does not aim at exploring the mathematical sophistication of the techniques. The LPP models included in this course is just meant for the purpose of enriching the prospective teacher-educators reviewing the principles and methods learnt at the B.Ed. level.

Course Objective

- Review axiomatic approach to probability, random variables
- Define m.g.f. and describe its importance
- Distinguish between discrete and continuous probability distributions
- Find moments of linear combination of random variables and prove Central Limit Theorem
- Describe the meaning and types of sampling distributions from normal population and apply them
- Define, describe the importance of point estimation and interval estimation and apply them to solve problems.
- Distinguish between parametric and non-parametric tests of hypotheses and carryout tests of hypotheses,
- Describe the importance of the techniques of ANOVA and apply them to solve problems.
- Explain the concepts of partial and multiple correlation and regression and apply them to solve problems
- Explain the nature of OR and LP
- Explain and apply the basic methods used in OR and LP
- Formulate and solve problems by using the techniques of OR.

Course Contents

Unit I : Axiomatic Approach to Probability, Random Variables and Distribution Function **3 hrs.**

Random variables and some theorems, distribution functions and its properties, discrete random variable, probability mass function, discrete distribution functions, continuous random variable, probability density function, distribution functions of continuous distribution,

Moments and Mathematical Expectation, Moment and its properties, Addition theorem, Multiplication theorem, Covariance, Expectation of Continuous Random Variables.

Unit II : Moment Generating Functions **3 hrs.**

The Chebyshev's theorem. Some theorems on m.g.f. including the theorems on the effect of change of origin and scale.

Unit III : Some Discrete Probability Distributions and their Applications **6 hrs.**

- The binomial distribution and its properties
- The hypergeometric distribution and its properties
- The poisson distribution and its properties : Recursion formulae of the above distributions
- Moments and moment generating functions of the respective distributions
- Relationship between the above-mentioned distributions

Unit IV : Some Continuous Probability Distributions and their Applications **5 hrs.**

- The uniform distribution.
- The normal distribution
- The exponential, the gamma, the beta distribution
- Moments and moment generating functions of respective distributions.

Unit V : Sums of Random Variables **5 hrs.**

- Sums of random variables and moment generating functions
- Moments of linear combination of random variable
- The Central Limit Theorem

Unit VI : Sampling, Distributions from Normal Population **7 hrs.**

- The distribution of mean
- The chi-square distribution and the distribution of variance
- The F-distribution.
- The t-distribution.

- Unit VII : Point Estimation** **4 hrs.**
- Introduction
 - Estimation and estimates
 - Properties of point estimators
 - Methods of point estimation
- Unit VIII : Interval Estimation** **6 hrs.**
- Confidence intervals
 - Confidence intervals for the mean and difference of means
 - Confidence intervals for proportions and difference of properties
 - Confidence interval for variances
- Unit IX : Tests of Hypothesis and their Applications** **7 hrs.**
- Introduction
 - Elements of a statistical test
 - Errors and power of a test
 - Test concerning means, Variances and proportions, Contingence tables, goodness of fit, Test concerning correlation coefficients and regression coefficient
 - Non parametric tests
- Unit X : Analysis of Variance** **5 hrs.**
- Introduction
 - One-way analysis of variance
 - Two way analysis of variance
 - Design of experiments
- Unit XI : Partial and Multiple Correlation and Regression** **4 hrs.**
- Regression Coefficient and equation to Regression plane.
 - Residual and partial Regression coefficient
 - Multiple correlation and partial correlation.
- Unit XII : Introduction** **2 hrs.**
- Origin and nature of Operation Research
 - Phases of Operation Research
- Unit XIII : Markov Chain** **5 hrs.**
- Formulation of Process as a Markov Chain
 - Probability Analysis by Markov Chains
 - Ergodic Markov Chains
 - Determination of Steady-State Conditions
 - Absorbing Markov Chain and their analysis.
- Unit XIV : Linear Programming** **4 hrs.**
- Mathematical Formulation of LPP
 - Graphical Solution of LPP

- Simplex Methods of Solution of LPP
- Some Special Types of LPP. Transportation and Assignment problem and the algorithms to solve the N-W corner method and Vogel's method

Unit XV : Game Theory

4 hrs.

- Meaning of a game theory competitive game, matrix game, some basic terms
- Two person Zero sum games
- Strategies in games
- Games with mixed strategies
- Optional strategies for non-strictly determined games
- Expected value of a game
- Fundamental theorem of game theory
- Methods of solution to the matrix games
 - * Saddle Point Method, Probability Method.
 - * Rule of Dominance Method, Graphic Method,
 - * Method of LP, Algebraic Method.

Unit XVI : Queuing Theory

5 hrs.

- Queuing system and its characteristics
- Classification of Queuing models, symbols and notations
- Transient and steady states
- Poisson process and exponential distribution
- Distribution of interval and service times
- Classification of queues
- Poisson queues (or models) and their characteristics

Evaluation

Written examination at the end of the academic session

External examination- 100%

Textbooks

1. Freund, John E. **Mathematical Statistics**, Prentice Hall of India Pvt. Ltd. New Delhi.
2. Goel and Mittal, **Operation Research**, Pragati Prakashan, Meerut.
3. Shamblin and Stevens Jr. (1974) **Operations Research: A Fundamental Approach** International Student Edition, Mc GrawHill Kogakusha Ltd..

References

1. Gupta, S.K., Kapoor V.K. **Fundamentals of Mathematical Statistics**, Sultan Chand and Sons, Delhi.
2. Gupta and Swamps, **Operations Research**, Sultan Chand and Sons, New Delhi.
3. Gupta, R.K., **Operation Research**, Krishna Prakashan Mandir Meerut U.P. India.

4. Hogg, Robert V., Graig, Attest, **Introduction to Mathematical Statistics**, Gulabi Primlani, Amerind Publishing Co. Pvt. Ltd. and G.D. Makhija of the India Offset Press, New Delhi.
5. Kapoor J.N. and Saxena, H.C. **Mathematical Statistics**, S.Chand and Company Ltd. Ram Nagar, New Delhi.
6. **Modern Applied Mathematics**, J.C. Turner (ELBS)
7. Pandit, R.P. (Ph.D.), (1999), **Inferential Statistics**, Ananta Prakashan, Kathmandu.

Foundation of Mathematics Education

Course No. : Math Ed.-541

Full Marks : 50 (30T +20P)

Nature of the Course : Theoretical + Practical

Pass Marks : (12T + 10P)

Year: First

Periods per week : 4

Course Description

This course is intended to provide a broader and deeper understanding of the state of the art of mathematics education. It also deals with the mathematics learning theories and the development of mathematics education in Nepal. It is also designed to present the social diversity in mathematics education and deals with institutionalized mathematics education. Some research work concerning mathematics education is also included in this course. Students are required to pass in both theory and practical separately.

Course Objectives

- Describe the nature of mathematics education,
- Explain some learning theories and their implications for teaching mathematics,
- Describe the main features of different instructional strategies,
- Describe the cultural and social issues on mathematics education, and
- Describe the development of mathematics education in Nepal.

Course Contents

Unit I : The Nature of Mathematics

5 hrs.

- Mathematics : its world, culture and relevance
- Mathematics and structure of mathematics
- Mathematics and its philosophy

Unit II : The Nature of Mathematics Education

10 hrs.

- The meaning of mathematics education.
- Mathematics education and its philosophy
- Goals and objectives of mathematics education

Unit III : Mathematics Learning Theories

15 hrs.

- Ausubel's theory of meaningful learning.
- J.P. Dienes' views on learning mathematics.
- Gagne's theory of learning.
- R. Skemp's psychological learning of mathematics
- Implications of learning theories in mathematics teaching.

Unit IV : Types of Instructional Strategies

15 hrs.

- Skills on child-centered approaches
- Cooperative teaching approach
- Individualized instruction : nature, kind and process.

- Instruction for constructivism

Unit V : Instructional Materials

8 hrs.

- Instructional materials in the mathematics classroom.
- Mathematics labs.
- Programming and automation.
- Computers in mathematics teaching
- Games

Unit VI : Society and Institutionalized Mathematics Education

15 hrs.

- Social history of mathematics education.
- Cultural role of mathematics education.
- The image of mathematics in society.
- Mathematics curriculum as a social issues.
- Non-school alternatives for mathematics education.
- Social needs and reform in mathematics education.
- Gender issues in learning mathematics.

Unit VII : Mathematics Education in Nepal

7 hrs.

- History of mathematics education.
- Analysis and appraisal of mathematics curriculum in terms of objectives, learner's abilities, national and social needs.
- Role of students and teachers.
- Analysis of teaching approaches and instructional materials.
- Evaluation of learners and teacher (S.L.C. and others, if any)

Evaluation Scheme

Theory - 60 %
Practical - 40 %

The practical aspect of this course will be internally evaluated on the following basis :

	Item	Scale	Point
1.	Group report on Learning Theory (Each individual's performance in the group will be evaluated in the scale)	(Very good, good, fair, poor)	4
2.	Preparation of Modules (Individual)	” ” ”	6
3.	Group Work on Cultural and Social Issues on Math Education (Individual participation)	” ” ”	4
4.	Group work on Math		

Curriculum	”	”	”	6
a. Group work (Individual Contribution)	”	”	”	
b. Paper presentation (Individual Contribution)				

References:

1. Ambrosio U, (1985), **Socio-cultural Bases for Mathematics Education**. UNICAMP.
2. Aichel and Reys, **Readings in Secondary School Mathematics**, Prindle, Weber and Schmidt, Inc. 1977.
3. Butler and Wren, **The Teaching of Secondary Mathematics**, McGraw-Hill.
4. David Kirby, **Games in Teaching Mathematics**, Cambridge university Press.
5. Howson, **Mathematics Education: A Historical views, Impact of Science on Society**.
6. John Castello, **Teaching and Learning Mathematics**.
7. Kapur, J.N., **Fascinating World of Mathematical -Sciences Vol. 4, Mathematics Education - I, II**, Mathematical Science Trust Society, New Delhi.
8. **Mathematical Methods-** The school Mathematics Project.
9. **Mathematics Education and Society - UNESCO Document**
10. NCED Evaluation Report
11. PRIME Project, + 2 report
12. Rechard Skemp, (1982), **The Psychology of Learning Mathematics**, Penguin Books.
13. Servais and Verga, (1971), **Teaching School Mathematics**, Penguin Books, Inc. UNESCO.

Mathematical Analysis

Course No. : Math. Ed. 551
Nature of Course : Theoretical
Year: Second

Full Marks : 100
Pass Marks : 40
Periods per week : 5

Course Description

This course is designed to provide the prospective maths teacher educators with the sound knowledge of basic techniques of real analysis and complex analysis and some techniques of numerical methods. The topics on real analysis deal with the theory of measure and integration in the simple setting of Euclidean space. The topics on complex analysis deal with basic definitions and properties of complex numbers, functions of complex variables, complex differentiation, integration, series, residues and conformal mappings. Further more the course deals with some numerical techniques such as interpolation, numerical differentiation and integration.

Course Objectives

- Explain basic concepts in \mathbb{R}^n
- Illustrate the examples of functions of bounded variation.
- Prove the properties of Riemann-Stieltjes integral.
- Characterize Lebesgue measure and outer measure.
- Prove the properties of Lebesgue measurable functions
- Prove the properties of Lebesgue integrals
- Explain and prove the properties of L^2 and L^p spaces
- Give abstract treatment of Lebesgue measure and integration.
- Explain the function of complex variable as a generalization of real variable function
- Define conformal transformation and discuss some special transformation
- Prove the properties of complex integration
- Integrate and evaluate different types of complex integrals by applying Cauchy's residue theorem.
- Interpolate, differentiate and integrate numerically the given function.

Course Contents

Part I

Unit I : The Topology of Cartesian Spaces

5 hrs.

Points and sets in \mathbb{R}^n ; \mathbb{R}^n as a metric space, open sets, closed sets and compact sets in \mathbb{R}^n , Heine-Borel Theorem; Continuous functions and transformations .

Unit II : Functions of Bounded Variation; Riemann Stieltjes Integral **8 hrs.**

Functions of bounded variation and its examples; some properties of functions of bounded variation, Riemann-Stieltjes integral and its some properties.

Unit III : Lebesgue Measure and Outer Measure **12 hrs.**
Lebesgue outer measure in \mathbb{R}^n and its properties; Lebesgue measurable sets and its properties; Caratheodary - theorem

Unit IV : Lebesgue Measurable Functions **15 hrs.**
Measurable functions and its properties; semicontinuous function and its properties; Egorov's theorem; convergence in measure and its properties.

Unit V : The Lebesgue Integral **15 hrs.**
Integral of a nonnegative function, properties of the integral; integral of an arbitrary measurable function; relation between Riemann-Stieltjes integral and Lebesgue integral; Riemann and Lebesgue integrals.

Unit VI : L^p Classes **7 hrs**
 L^p classes; Holder's, and Minkowski inequalities L^p classes; Banach and metric properties; L^2 space; orthogonality; Parseval's formula; Hilbert spaces.

Unit VII : Abstract Integration **13 hrs.**
Additive set functions, measures, measurable functions, integration; absolutely continuous and singular set functions; dual space of L^p

Part II

Unit VIII : Review of Complex Number System Analytic Function **12 hrs.**

- Function of Complex Variable
- Mapping
- Theorems on Limits
- Continuity, Derivatives,
- Cauchy Riemann Equations,
- Sufficient Conditions,
- Polar Co-ordinates,
- Analytic Functions,
- Harmonic Functions,
- Elementary Functions

Unit IX : Integrals **12 hrs.**

- Definite Integrals of Complex-valued Functions of a Real Variable,
- Contour Integrals,
- Antiderivatives,
- Cauchy, - Goursat Theorem,

- Simply and Multiply Connected Domains, Cauchy Integral Formula,
- Derivative of Analytic Functions, Morera's Theorem,
- Maximum Moduli of Functions,
- Liouville's Theorem and Fundamental Theorem of Algebra

Unit X : Series

10 hrs.

- Convergence of Sequences and Series,
- Taylor's Series,
- Laurent's Series
- Absolute and Uniform Convergence of Power Series,
- Integration and Differentiation of Power Series,
- Uniqueness of Series Representation

Unit XI : Residues

16 hrs.

- Singular Points,
- Types of Singularities,
- Residue Theorem,
- Principal Part of a Function,
- Residues at Poles,
- Zero's and Poles of order,
- Evaluation of Improper Real Integrals, Improper Integrals Involving Sines and Cosines,
- Definite Integrals Involving Sines and Cosines, Integration Through a Branch Cut,
- Rouché's Theorem.

Unit XII : Mapping by Elementary Functions

10 hrs.

- Linear Functions,
- The Function $1/z$,
- Linear Fractional Transformations,
- Mappings of the Upper-Half Plane,
- The Transformation $w = \exp z$ and Logarithms,
- The Transformation $w = \sin z$,
- The Function z^2 ,
- The Function $z^{1/2}$,
- Preservation of Angles,

Part III

Unit XIII : Interpolation

9 hrs.

Errors in Polynomial Interpolations; Finite Differences; Detection of Errors by Use of Difference Tables; Differences of a Polynomial; Newton's Formula for Interpolation; Central Difference Interpolation Formula; Practical Interpolation; Interpolation With Lagrange's Interpolation, Unevenly Spaced Points; Divided Differences and their Properties; Inverse Interpolation.

Unit XIV : Numerical Differentiation and Integration **6 hrs.**
Numerical Differentiation; Maximum and Minimum Values of a Tabulated Function; Numerical Integration; Simpson's 1/3 and 3/8 Method, Trapezoidal Method; Gauss Legendre Quadrature

Evaluation Techniques

Written examination at the end of the session.

External examination- 100%

Text book

1. Churchill, R.V. and Brown, J.W. (1990), **Complex Variable and Applications**, Mc Graw Hill Publishing Co.
2. Sastry, S.S., (1990), **Introductory Methods of Numerical Analysis**, Prentice Hall of India, New Delhi.
3. Wheeden, R.L., and Zygmund, A., (1977), **Measure and Integral : An Introduction to Real Analysis**, Marcel Dekker, Inc., New York and Basel.

References

1. Ahlfors, L.V. (1979), **Complex Analysis** (International Student Edition) Mc Graw Hill Book Co., Tokyo.
2. C. Xavier, **Numerical Method- Fortran 77**
3. Curtis F. Gerald, Patrick O. Wheathly : **Applied Numerical Analysis**
4. Cohn , D.L., (1993), **Measure Theory**, Birkhauser Boston.
5. Husking, R.J., Joyce, D.C. and Turner, J.C., (1978), **First Step in Numerical Analysis**, Hodder And Stoughton London.
6. Hewitt, E. and Stromberg, K., **Real and Abstract Analysis**, Narosa
7. Jain, P.K. and Gupta, V.P., (1986), **Lebesgue Measure and Integration**, Wiley Eastern Limited, New Delhi.
8. Publishing House, (1978), New Delhi.
9. Royden, H.L., **Real Analysis**, Macmillan Publishing Co., New York, 1968. Sharma, J.N., (1998), **Functions of a Complex Variable**, Krishna Prakashan Media, Meerut.
10. Scarborough, J.B., (1966), **Numerical Mathematical Analysis**, Oxford and IBH Publishing Co., New Delhi.

Number Theory and History of Mathematics

Course No. : Math. Ed. 561
Nature of the Course : Theoretical
Year: Second

Full Marks : 50
Pass Marks : 20
Periods per week : 3

Course Description

This course is designed to give the prospective teacher educators a simple account of the theory of numbers and to familiarize them with the development of mathematics from the origin of the concept of counting to the threshold of the beginning of modern mathematics. It acquaints the teachers with one of the basic components of mathematics directly needed for their profession and the scenario of the discipline of mathematics from the life, achievement and the contribution of some of the mathematicians.

Course Objectives

- Understand the classical number theory
- State and prove divisibility properties of integers and apply this knowledge
- Prove the fundamental theorem of arithmetic
- Define congruency and linear congruency and investigate the many important properties of these concepts.
- Use the knowledge of congruency and linear congruency to prove Fermat's little theorem and Wilson's theorem
- Prove and apply Quadratic Reciprocity Law.
- Apply the results of the theorems on number theory to solve related problems.
- Articulate the development of mathematics under different civilizations, middle age and modern period.
- Identify the different turning points in the development of mathematics through different ages.
- Familiarize with the contributions made by mathematician in different periods.

Course Contents

Unit I : Divisibility Theory in the Integers

6 hrs.

- Division Algorithm, GCD
- Diophantine Equation $ax+by=c$
- Prime and relatively prime numbers, its distributions.
- The fundamental theorems of Arithmetic
- Goldbach's conjecture

Unit II : The Theory of Congruences

7 hrs.

- Congruence and its properties
- Complete set of residues
- Special divisibility tests

- Linear congruences
 - Theories on linear congruence
- Chinese Remainder theorem

Unit III : Fermat's Theorem **10 hrs.**

- Fermat's factorization method
- Fermat's little theorem
- Wilson's theorem
- Euler's function
- Euler's Generalization

Unit IV : Quadratic Reciprocity Law **15 hrs.**

- Euler's criterion
- Legendre's symbols and its properties
- Gauss's Lemna
- Quadratic reciprocity
- Quadratic congruences with composite moduli

Unit V : Early Mathematics **2 hrs.**

Numerical Systems : Babylonian and Egyptian Mathematics

Unit VI : Greek Mathematics **6 hrs.**

Pythagorean Mathematics, Duplication, Trisection and Quadrature; Euclid and his Elements, Greek Mathematics offer Euclid

Unit VII : Mathematics of Different Continents **7 hrs.**

Chinese, Hindu and Arabian Mathematics; European Mathematics, 500-1600 AD.

Unit VIII : Mathematics of Seventeenth Century **10 hrs.**

Beginning of Modern Mathematics; Analytic Geometry and Other Pre-calculus Developments; the Calculus and Related concepts

Unit IX : Mathematics of Eighteenth Century and After **12 hrs.**

The Eighteenth Century and the exploitation of the calculus; The early nineteenth century and the liberation of geometry and algebra; the later nineteenth century and the arithmetization of analysis; Abstraction and the transition into the twentieth century

Evaluation Techniques

Written examination at the end of the academic session

External examination: 50 Marks

Unit-wise mark distribution

Unit 1 to 4 : 30 marks

Unit 5 to 9 : 20 marks.

Textbooks

1. Burton, D.M., **Elementary Number Theory**, Universal Book Stall, New Delhi.
2. Eves, H.W., (1976), **An Introduction to the History of Mathematics**, Fifth Edition, Holt, Rinehart and Winston, USA.

References

1. Boyer, C.B., **A History of Mathematics**, John Wiley - New York.
2. Courant, and Robins, (1969), **What is Mathematics**, Oxford University Press. New York.
3. Dickson, L.E., **Introduction to the theory of Number**.
4. Niven, Ivan, Zukerman, H.B., **An Introduction to the Theory of Number**, Willey Easten Ltd., New Delhi.

Recent Trends in Mathematics Education

Course No. : Math. Ed. 590

Full Marks : 50 (30 T+20P)

Nature of the Course : Theoretical + Practical

Pass Marks : 12 T + 10 P

Year: Second

Periods per week : 4

Course Description

This course is intended to provide skills and knowledge in progress made so far in various aspects of mathematics education at different levels of the school and the university. Besides, it reviews the themes, issues and the recommendations made by different international education conferences. This course also deals with the present status and trends of research in mathematics education. Students are required to pass in both theory and practical separately.

Course Objective

- Explain the trends in mathematics education at the school and the higher secondary school level.
- Analyze the trends in geometry teaching.
- Analyze the trends in the teaching of applied mathematics.
- List the themes, issues, and recommendations made by different conferences.
- Evaluate different issues concerning gender and culture.
- Describe the recent direction in research in mathematics education.

Course Contents

Unit I : Mathematics Education at Different School Levels and at University 20 hrs.

- Trends in mathematics education at lower secondary and secondary level.
- Trends in mathematics education at higher secondary level.
- Trends in mathematics education at higher education level.

Unit II : Geometry in Schools 17 hrs.

- Reforms in instruction in school geometry
- Trends in geometry teaching in different countries including Nepal
- Issues and problems on the teaching of geometry for the 21st century

Unit III : Educational Implications of Applied Mathematics 10 hrs.

- The concept of applied mathematics and the rationale to teach applications of mathematics
- Trends in teaching applied mathematics.
- Issues and problems of applied mathematics in mathematics education.
- The impact of applied mathematics on mathematics education.

Unit IV : Mathematics Education Conferences 8 hrs.

- International Mathematical Union (IMU) and International Commission on Mathematical Instruction (ICMI)
 - History, aims and objectives, responsibilities and activities.

- Mathematics Education Congress in different countries.
 - Themes, issues and problems, recommendation of the conferences.
- International Congress on Mathematical Education (ICME)
 - History, Issues and problems of different congress.

Unit V : Issues in Mathematics Education **14 hrs.**

- Mathematical olympiads
 - History, recommendations importance, reviews of national, regional and international olympiads.
- Popularization mathematics
 - Views on popularization, Issues for popularization, Recommendations
- Issues concerning
 - a) Gender differences in learning mathematics
 - b) Ethnomathematics issues in mathematics education.
 - c) Individual differences and special needs (slow and gifted) (Objectives, aids, and trainings for special need children)

Unit VI : Research in Mathematics Education **6 hrs.**

- Introduction
- View on research in mathematics education
 - Empiricist view
 - Intuitions view
 - Constructivism teachers' view
- Areas of Research
 - Curriculum, methods and materials
 - Learning and learners.
 - Learning and teachers.
- Forecasts and recommendations

Evaluation Scheme

Theory - 60 %
Practical - 40 %

The practical aspect of this course will be internally evaluated on the following basis :

	Item	Scale	Point
1.	Presentation on Mathematics Education at School Level	(V.Good Good Fair Poor)	4
2.	Presentation on Conferences	" "	4
3.	Presentation on Issues	" "	4
4.	Presentation on Geometry in Schools	" "	4
5.	Presentation on Implications of the Applied Mathematics	" "	4

Each student is required to take part in any three of the above-mentioned five presentations and give his/her comments/ suggestions on the remaining two presentations.

References

1. Carss, Marjorie (ed.) **Proceedings of the 5th International Congress of Trends in Mathematics Teaching** Vol. III, UNESCO.
2. Kapur, J.N., **Fascinating World of Mathematical Science**, Vol., 6, Mathematical Science Trust Society, New Delhi.
3. Lindquist, M.M., **Selected Issues in Math Education** Page 90-105, 1980.
4. **Mathematics Education**, National Society for the study of Education, 1970.
5. **Mathematics Education**, Birkhauser, • Boston • Baral • Stuttgart.
6. **New Trends in Mathematics Teaching** Vol. IV, UNESCO
7. **Studies in Maths Education** Vol. 5, UNESCO 1986.
8. **Proceeding of the conference on perspective on the Teaching of Geometry for the 21th century.**
9. **Proceeding of the UCSMP Instructional conference on Mathematics Education** NCTM 1987.
10. **Proceedings of the International Congress on Mathematical Education**, NCTM.
11. Selinger, M.Ed. **Teaching Mathematics**, Open University.

Studies in Mathematics Education

Course No. : Math Ed. 591
Nature of the Course : Practical
Year: Second

Full Marks : 50 (P)
Pass Marks : 25
Periods per week : 4

Course Description

This course is designed to provide prospective mathematics educators an opportunity for independent study on different issues of mathematics education such as curriculum development, classroom management, the use of instructional materials for teaching selected topics at the higher level, development of modules, empowerment of student learning, reading of mathematical society, mathematics education in a multi-cultural context, planning, assessment techniques, supervision skills, mathematics learning for an exceptional child, recent research in mathematics education, etc. These topics are presented with their objectives as examples below. The teachers are free to assign any other topics related to mathematics education. This course will be conducted in a seminar fashion. Each student is required to prepare a term paper and to present it to the seminar of a peer group arranged by the Department and/or teachers.

Course Objectives

- Demonstrate in-depth exposure to different issues of mathematics education.
- Put forward their opinions/suggestions on issues of mathematics education.
- Prepare and present an analytical write-up related to the aspects of mathematics education
- Prepare for and participate actively in seminar.
- Identify the relationship between mathematics and other disciplines
- Give a brief historical account of the reformations taking place in mathematics education throughout the world.

Course Contents

Unit I : Curriculum Development

- Definition
- Steps : Need, objectives, content/learning experiences and evaluation.
- Factors in revising a curriculum
- Study of Curriculum
 - H.S.S
 - P.C.L
 - B.Ed.
 - M.Ed
- Content analysis of tertiary contents

Unit II : Instructional Materials

- References section
- Low cost materials
- OHP
- Video-cassettes
- Model games

Unit III : Classroom Management

- The physical aspects of classroom.
- Expectations and limits
- Handling disciplinary problems

Unit IV : Teaching selected Topics

- Teaching algebra
- Teaching geometry
- Teaching calculus
- Teaching vector
- Teaching analysis
- Teaching probability and statistics

Unit V : Issues and Problems on Mathematics Education

- Gender differences in learning mathematics
- Cultural Ethno-mathematics
- Individual differences (objectives, aids, and training for special need children)
- Continuing education, goals of distance education and adult education.
- Training of Mathematics Teacher

Unit VI : Additional Enrichment in Mathematics Education

- Games and Puzzles
- Student empowerment
- Mathematical societies
- International Olympiad, History, regional and international games.
- Research in mathematics education
- Different views
- Different areas

Unit VII : Planning

- Needs of planning
- Types of planning
- Preparation of objectives
- Selection of materials
- Writing lesson plan

Unit VIII : Assessment in Mathematics Education

- Assessment techniques
- Planning and evaluation of tests
- Constructing a test
- Administering a test
- Scoring a test
- Item analysis
- Analysis of test results
- Grading and record keepings

Unit IX : Different Movements in Mathematics Education

- Curriculum and evaluation standards
- Professional teaching standards

Unit X : Supervision in Mathematics Education

- Steps of supervision, observation techniques, classroom observation critiquing
- Feed-back session

Unit XI : The Growth of Mathematical Science

- Mathematics and social science
- Mathematics and science
- Nature, man and mathematics
- Intuition, structure and heuristic methods in Mathematics Education
- The role of axioms in Mathematics Education
- Mathematical way of thinking
- Mathematics, amusements and fancies.

Unit XII : Reforms in Math Education

- Historical development of different movements in Mathematics Educaiton.
- Demmark, Switzerland,
- School Mathematics Project (U.K.)
- Compare and contrast among the above countries
- Maths curriculum of USA and UK.
- Objectives, contents and evaluation procedure

Evaluation Scheme

The students enrolled in this course will be evaluated internally and externally on the following basis.

<u>Item</u>	<u>Scale</u>	<u>Weightage</u>
Relavency of Topics	(VG-G-Fair-Poor)	10%
Format Followed	”	10%
Presentation	”	30%
Quality of the paper	”	30%
Participation	”	20%
		<hr/> 100%

Computer Science Education (Elective Subject)

Course No.: Math Ed. 571

Full Marks: 50 (20 T+30 P)

Nature of the course: Theoretical and
Practical

Pass Marks: 8T + 15P

Periods per week: 4 (1T + 3P)

Year: Second

Pre-requisite of this course:

- a) B.Ed. Pass with Computer Science as an Optional subject: OR
- b) Knowledge of Computer Basics MS-DOS, Windows, MS-Word and MS-Excel.

Course Description:

This Course which is offered as an optional subject for M.Ed. students, is designed to make able to operate and use Disk Operating System (DOS), Window 98/2000, Programming Language, Structured Database Management System, Multimedia, Email and Internet. In this course the students are required to complete a case study in QBASIC programme and a project work in Visual FoxPro.

Specific Objective:

- Operate disk operating system (DOS) and windows 98/2000
- Operate Window based Word processing and Spreadsheet general package (to create, save, edit copy and print a file to design a graphical picture, to design mathematical tables, to draw Line Graph, Pie chart, Bar diagram, etc.)
- Operate E-mail including file attachment
- Design WebPages, and keep it on the Internet and access
- Run CD-ROM disk to demonstrate educational packages using it
- Write and run mathematical programmes in QBASIC
- Create and run a database file using Window based Visual FoxPro
- Prepare a project report, which includes making reference to class notes, textbooks, question papers, graphical charts and mathematical tables using microcomputers in the educational activities
- Work as a computer Teacher Trainer
- Use computer as an educational tool, etc

Course Contents

Unit I: Window 98/2000

10 hrs.

- Introduction to Windows 98/2000.
- Managing folder files (Create, Select, Copy, Move, Rename, Search, Hide, Open, View etc.)
- Using tools.

Unit II : Database Management System (Visual Foxpro)**30 hrs.**

- Introduction to database
- Using Visual FoxPro
- Understanding your Information
- Data Management Process
- Understanding Database Logic
- Understanding the FoxPro Environment
- Building a Database
- Creating Database and Tables
- Entering, Editing and Maintaining data
- Retriving Information
- The Query Designer
- Reporting
- Advanced Query and Reporting
- Linking the Other Programs

Unit III : Project Work in Visual FoxPro**7 hrs.**

Participants will be given a project as given below. They have to complete the project work using Window based Visual FoxPro.

- School Information System (SIS)
- Management Information System (MIS)
- Library Information System (LIS)
- Inventory Control System (ICS)
- Payroll Sheet
- Students/Teachers/Staffs records keeping System
- Result Processing System
- Question Bank System, etc.

Unit IV : QBASIC Programming**25 hrs.**

- Programming Basics
- BASIC Data types
- Flow Charting
- Sample Programs
- Program
- Flow Control Mechanism in QBASIC
- Exercises
- Extensive Exercise
- Control Statements
- READ/DATA Statements

- Functions
- Subroutines
- Exercises (more than 20 lab works)

10 hrs.

Unit V : Case Study

3 hrs.

Any type of mathematical problems to be solved as follows using QBASIC

- | | |
|--------------------|----------------|
| a) Arithmetical | b) Algebraical |
| c) Trigonometrical | d) Statistical |
| e) Other | |

Unit VI : Internet, Email and Web page

35 hrs.

- Introduction to Internet
- Connecting to Internet
- Introduction to Web page (web page, web-site, Access create, Design and keeping web page on the net)
- Introduction to Email, Creating Sending, Receiving and Printing Email

Unit VII : Multimedia

10 hrs.

- Introduction to Multimedia
- Using and Playing CD-ROM diskette
- Video (Picture)
- Audio (Sound)

Methods of Teaching

- Class Lecture
- Practical class (lab works more than 20 exercises)
- Discussion and Demonstration
- Project work and Case studies

Evaluation Techniques & Scheme:

	Subject	Time	F. Mark	P. Mark
1.	Theory Test (Final Exam)	1.5 hr	20	8
2.	Practical Test (Final Exam)	1.5 hr	20	10
3.	Project work: (Internal work)	7 days	10	5
	Total Mark		50	23

Instructional Materials:

Hardware and Software Requirement

a) Hardware requirements:

- Pentium II or III Computer
- RAM 64 MB, Hard Disk 8 GB, Mouse with Mouse pad
- Speed 500 MHz with CD-ROM Readable Drive
- Sound Card and Sound Blaster

- Laser Printer or Inkjet or Dot Matrix Printer
- Air condition or Inlet/Outlet Fan
- A full furnished computer lab room with good facilities.
- A Modem, an UPS and a dedicated telephone line in computer lab.

b) Software requirements

- MS-DOS, Windows 98/2000
- Foxpro, QBASIC, MS-Word, MS-Excel, Email, Internet

Textbooks

1. Shrestha H.G. ABC of Windows 98,
2. QBASIC Programming : using Help Menu note of QBASIC
3. King Nelson Visual FoxPro 5.0 for Windows: BPB Publication, New Delhi.

Reference Books

1. हरि गोपाल श्रेष्ठ कम्प्युटर परिचय (पाँचौं संस्करण)
2. FoxPro for windows, (Edition 1999): Mr. DP Nagpal (Whlecr Publication, New Delhi)
3. Nagpal D.P. Fox Pro for Windows 1999. Whdev Publication new Delhi.

Sl. No.	Name of the Book	Author	Publisher
1	ABC of Windows 98	Shrestha H.G.	BPB Publication
2	QBASIC Programming	Using Help Menu note	QBASIC
3	Visual FoxPro 5.0 for Windows	King Nelson	BPB Publication
4	ABC of Computer	Harish Gopal Shrestha	Whlecr Publication
5	Fox Pro for Windows	D.P. Nagpal	Whdev Publication

THESIS WRITING

Course No.: Ed. 598
Nature: Practical
Year: Second

Full Marks: 50
Pass Marks: 25
Duration:

Course Description

The course is designed to provide the students with hands-on experience in educational research and thesis writing. In this course, the students will have an opportunity to apply the theoretical knowledge of educational research to research such as identification of research problem, development of research instruments, preparation of research design, collection, analysis and presentation of data and writing of the thesis report.

The major purposes of the course are to help students design and conduct educational research studies independently and use the findings of the studies to make the research work meaningful.

Course Objectives

The course intends to accomplish the following specific objectives:

- To develop competencies on the part of the students in identifying and defining research problems, preparing data collection instruments, and collecting and analyzing the data;
- To help students search and review relevant literature;
- To enable students to use the findings of research studies in thesis writing
- To enable students to prepare a research report in one's chosen area of study.

Prerequisites of the course

- The students must have passed the first year of M.Ed. before undertaking the thesis work.
- Viva voce for the thesis of the student will be conducted only after passing all the courses offered in the second year of M.Ed.

Requirements

- The Departmental Research Committee (DRC) will seek thesis proposals from the students approve the proposals and designate the thesis guides for the students
- The student should prepare and submit to the DRC a brief research proposal on the chosen area of study as per the format.
- The students should face an oral examination to finalize the proposal in the DRC.
- The students should undertake the study under the guidance and supervision of the guide designated by DRC.
- The student should submit 4 copies of the thesis to the department concerned.

- The thesis should be prepared as per the format supplied by the concerned department. A suggested format is given below:

Format for thesis writing

I. Introduction

- Background/the context
- Statement of the problem
- Significance of the study
- Objectives of the study
- Hypotheses of the study (if applicable)
- Limitations of the study
- Definitions of appropriate terms

II. Review of Related Literature

- Theoretical framework of the study
- Related literature (in and outside Nepal)

III. Methodology

- Research design
- Population and sampling
- Instrumentation
- Data collection and analysis procedures

IV. Analysis and Interpretation of Data

V. Summary, Conclusions and Recommendations

- Summary
- Conclusions
- Recommendations

VI. Selected References (Bibliography) Annexes/Appendices

Evaluation of the Thesis

The thesis will be evaluated on the basis of its written quality and the performance of the student in viva voce. Of the total weightage given to thesis course, seventy percent weightage will be allocated to the written quality of the thesis and the remaining thirty percent will be allocated to viva voce. A Thesis Evaluation Committee (TEC) will evaluate both the written quality of the thesis and viva voce of the student. The average of the marks individually awarded by the TEC members will be treated as the final mark of the student. The evaluation criteria are given below.

Criteria for Evaluating Masteral Thesis

Written Quality

Weightage

Appropriateness of method (s) and the quality of instruments	10
Clarity of conceptual/theoretical framework and or literature review	10
Appropriateness of presentation and analysis of result	10
Appropriateness of conclusions and suggestions	10
Overall organization of the report (format, use of references and bibliography)	10
Contribution of the study to related theory and practice	10
Overall quality of the report	10
Total	70%

Oral Quality

Presentation of the research work (Substantive part, Methodology, Findings Conclusions)	20
Accuracy, fluency and clarity of verbal presentation	10
Total	30%

Grand Total: 100%

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