Course Title: Historical Development of Mathematics Full Marks: 100

Course Number: Math Ed. 424 Pass Marks: 35

Nature of Course : Theory Periods Per week: 6

Level: Bachelor Degree Total Period: 150

Year: second

1. Course Description

Mathematical Knowledge first developed for practical needs that provided great intellectual interest to ancient scholars in different civilizations. In course of getting solutions of practical problems like problem of antiquity they got stuck and later developed new outlook and love to enhance and enrich knowledge for the sake of knowledge even with no practical application in mind. But in later period other areas were discovered where theoretical mathematics were used. Thus this course deals with a very brief history of mathematics with respective contributions of mathematicians involved.

1. General Objectives: The general objectives of this course are to encourage and enable students to
2. Recognize that mathematics permeates the world around us.
3. Appreciate the usefulness, power and beauty of mathematics.
4. Appreciate the internal dimension and development of mathematics in relation to its multicultural and historical perspectives.
5. Develop a critical appreciation to reflect upon the work of different mathematicians who added some knowledge in existing knowledge.
6. Describe the developmental aspects in the growth of different sectors (Arithmetic, geometry, algebra, trigonometry, calculus and probability) of mathematics.
7. Specific Objectives and Contents

Students are expected to describe the major concepts of each mathematician who added some bricks in the development of specific subject area. So, at the end of the course, students should be able to:

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| Specific Objectives | Contents |
| * Explain the major events in the development of number system in different civilizations. * Summarize the major contributions of different mathematicians in the development of arithmetic. * Sketch the brief history of arithmetic. | Unit: I: Historical Development of Arithmetic (**15)**  1.1 Ancient Period: Egyptian, Hindu, Babylonian, and Chinese  1.2 Medieval Period  1.3 Modern Period |
| * Explain the major events in the development of Geometry in different eras. * Summarize the contributions of different mathematicians in the development of Geometry. * Sketch the brief history of Geometry. | Unit: II: Historical Development of Geometry (**24**)  2.1 Early Greeks  2.2 Analytic Geometry  2.3 Projective and Descriptive Geometry  2.4 Algebraic Geometry  2.5 Differential Geometry  2.6 Non-Euclidean Geometry  2.7 Topology |
| * Explain the major events in the development of Algebra in different eras. * Summarize the contributions of different mathematicians in the development of Algebra. * Sketch the brief history of Algebra. * Sketch the brief history of vector. | Unit: III: Historical development of Equations and Algebra (**26**)  3.1 Equation, Determinant and Matrix  3.2 Equation, group, and field  3.3 Link with Analysis  3.4 Link with Number theory  3.5 Link with Linear Algebra |
| * Explain the major events in the development of Trigonometry in different eras. * Summarize the contributions of different mathematicians in the development of Trigonometry. * Sketch the brief history of Trigonometry. | Unit: IV: Historical development of Trigonometry (**14**)  4.1 Ancient Period  4.2 Medieval period  4.3 Trigonometric function  4.4 Trigonometric series |
| * Explain the major events in the development of Calculus in different eras. * Summarize the contributions of different mathematicians in the development of Calculus. * Sketch the brief history of Calculus. | Unit: V: Historical development of Calculus and Analysis (**26**)  5.1 Exposition of calculus  5.2 Differential Equation  5.3 Calculus of variation  5.4 Analysis |
| * Explain the major events in the development of Function in different eras. * Summarize the contributions of different mathematicians in the development of Function. * Sketch the brief history of Function. | Unit: VI: Historical development of Functions (**13**)  6.1 Ancient Period  6.2 Medieval Period  6.3 Modern Period |
| * Explain the major event in the development of Probability in different eras. * Summarize the contributions of different mathematicians in the development of Probability. * Sketch the brief history of Probability. | Unit: VII: Historical development of Statistics and Probability (**21**)  7.1 Laws of large number  7.2 Central Limit Theorem  7.3 Statistics  7.4 Large number and limit theorems |
| * Sketch the brief history of mathematics in Nepal. * Sketch the brief time line of mathematical works in Nepal. | Unit VIII Development of Mathematics in Nepal (**11**)  8.1 Ancient Period  8.2 Medieval Period  8.3 Modern Period |

1. Instructional Techniques

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| Unit | Specific instructional Techniques |
| I | Lecture methods, Question-answer methods on different civilizations: Ancient Period: Egyptian, Hindu, Babylonian, and Chinese. Medieval Period: Aryabhat, Mahavira, Modern Period: Peano, Weierstrass Poincare |
| II | Presentation followed feedback session on the contribution of Pythagoras, Euclid, Proclus, Descartes, Fermat, Newton, Gauss, Lobachevsky, Riemann, Monge, Steiner, and Hilbert |
| III | Project given in a group on the contribution of Diophantus, Hypatia, Brahmagupt, Bhaskara, Al-Khwarismi, Fibonacci, Viete, Descartes, Fermat, Agnesi (cubic curve), Gauss, Euler, Galois, Boole, Hamilton, Noether |
| IV | Lecture methods followed by discussion on the contribution of Thales, Eratosthenes, Ptolemy, Aryabhatta, Regimontanus, Viete, Euler |
| V | Presentation followed feed back session on the contribution of Zeno, Eudoxus, Archimedes, Pappus, Kepler, Cavaliers, Leibnitz, Newton, Bernoulli, L’Hospital, Euler, Laplace, Cauchy, Weirestrass, Dedekind, Riemann, Sonja, Labesque |
| VI | Lecture methods followed by discussion on the contribution of Ancient Period, Medieval Period, Leibnitz, Euler, Fourier, , Dirchlet, Cantor |
| VII | Presentation on the contribution of Pascal, Fermat, Huygens, Cardano, Bernoulli. De Moivre, Lagrange, Laplace, Gauss, Poisson, Chebyshevs, Galton, Pearson, Fisher, Newman |
| VIII | Guest lecture on the contribution of Gopal Pande, Naya Raj Panta, Chakra Pani Aryal, Chandra Kala Devi Dhananjaya |
| Suggestion | Most of topics are covered from the book written by Cooke. Further elaboration supposed to covered by other books. |

1. Evaluation

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| Type of questions | Total question asked | Marks allotted | Total Marks |
| Group A: Multiple choice | 20 questions | 20 x 1 marks | 20 Marks |
| Group B: Short Answer | 8 with 3 alternative | 8 x 7 marks | 56 marks |
| Group C: Long Answers | 2 with 1 alternative | 2 x 12 marks | 24 marks |

1. Recommended Books and Reference Books

**Recommended books**

Cooke, R. (1997). *The history of mathematics: A brief course*. New York: John Wiley & Sons, Inc. (Unit I-VII)

Eves, H. (1984). *An introduction to the history of mathematics (5th ed.).* New York: The Saunders series.

Pant, N. R. (1980). *Gopal Pande & his rule of cube root.* Kathmandu: Nepal Academy

**Reference Books and reading materials**

Bhattarai, L. N,; Adhikari, K. P. & Neupane, A. (2013). *The history of mathematics*, (1st ed.). Kathmandu: Quest Publication Pvt. Ltd.

Bhushan, B. D. et. al (2011). *History of Hindu Mathematics (part I & II),* Cosmo Publications.

Boyer, C. B. (1968). *A History of mathematics*. New York: John Willy & Sons Inc.   
(Unit I-VII)

Burton, (2007). *The History of Mathematics: An Introduction*, (6th ed.), the McGraw−Hill Companies. (Unit I-VII)

Pant, N. R (1982). *Comparison of ancient and new mathematics*. Kathmandu: Nepal Academy

Struik, D. J. (1948). *A concise history of mathematics*, Vol. I and II (4th ed.). New York: Dover Publication, Inc. (Unit I – VII)