

## **DEPARTMENT OF MATHEMATICS, KUMAUN UNIVERSITY : A PROFILE**

### **INTRODUCTION**

Throughout history, study of mathematics has helped many experience extraordinary accomplishments. The instilled knowledge has allowed civilizations to develop, worlds to unfold, one equation at a time. Noted Philosopher Kant has expressed his opinion as:

*In every specific natural science there can be found only so much science proper as there is mathematics present in it. " I.Kant*

Fundamental comprehension in every practical aspect of life gives room for independent thought, therefore less interruptions from external forces. Creativity, confidence, courage, persistence, and many other virtues often cultivate from knowledge, wisdom, and relevant control within oneself. In older cultures, Mathematics has always been closely related to religion and philosophy, and, through the ages, mathematical achievements have been deemed to be among men's finest. Besides being a contemplative art, mathematics has always been used to solve practical problems.

Mathematics came into being through the yearning to solve the mysteries of the universe and still works for us in that way and therefore there is always a need that all faculty members of mathematics keep pace with the latest emerging trends in mathematics and provide the students with a broadly based course of study directed towards an understanding of mathematics and its relation to other fields of study. All faculty members are actively engaged in research, academic and administrative activities of the University in the true spirit of mathematics learners and are dedicated to the cause of students of the University under the leadership of University Head, Prof.H.S.Dhami who is Member, Editorial Board of Vikram Mathematical Journal and has been entrusted with the additional responsibilities of Coordinator IT, Director ICT and Examination Controller of the University.

The Department of Mathematics of Kumaun University at DSB Campus came into existence long back in 1951 under the leadership of Dr. A.N. Singh, a renowned scholar of Hindu Mathematics while that of SSJ Campus, Almora, in the year 1962. Both these departments are one of the biggest in the two Campuses in terms of strength of the students. The department of DSB Campus has a well stocked library, supported by NBHM under its library grant scheme, for providing research facilities to students pursuing the degree of Doctor of Philosophy in Mathematics. Prof. M.C. Joshi is the Regional Coordinator of the Mathematical Olympiad Activity (NBHM).

The teaching of Computer Science and Statistics was initiated by Mathematics department at the two Campuses and with the passage of time these two have become independent departments of the University. The teaching and management of Information Technology at Almora Campus is being administrated by the HOD Mathematics.

## **Research activities:**

### **(a) Research Areas:**

The teachers of the department are actively engaged in the following areas of research:

#### **DSB Campus**

Dynamical Systems  
Geometry  
Fixed Point Theory  
Fuzzy and Non Linear Analysis  
Number Theory

#### **SSJ Campus**

Differential Geometry  
Relativity  
Mathematical Statistics  
Mathematical Modelling  
Mathematical Linguistics  
Applications of Special Functions

### **(b) Publications:**

A number of research papers of the researchers of the department appeared in the Journals of International Repute which bear many citations.

### **(c) Computer Laboratory and Computer literacy programs:**

At SSJ Campus a well-equipped computer lab has been established. The Department proposes to start a 01-year course on Computational Financial Mathematics with the help of a software known as Mathematica, Math Cad and Mat Lab. This course will boost the employment opportunities for students.

At DSB Campus also the Department has a well-equipped computer laboratory. The aim is to devise and undertake short term courses on computer literacy program for postgraduate students of the Department. The programs include teaching of computer fundamentals, programming languages and mathematical software like MATLAB and MATHEMATICA and handling of Scientific word processor like LATEX.

## **SPECIAL CONTRIBUTION OF THE DEPARTMENT:**

1. U.G.C. visiting team of Experts during 27-29 July 1988 has mentioned in its reports at Sr. No. 4 “At the Almora College Campus, the Zoology & Mathematics departments are more active in Research & teaching efforts & have some enthusiastic Faculty members”.
2. The peer team of NAAC which visited the University during 17-20 July, 2000 which awarded four star status to the University, has mentioned in its report on page-3 ..... ‘ the application of Mathematical tools to the study of local dialects are the other notable outputs’ , about our department.

## Sanctioned student-intake in different classes:

	DSB Campus	SSJ Campus
(a) UG Programs		
B.A./B.Sc. I	160	25+195=220
B.A./B.Sc. II	160	220
B.A./B.Sc. III	160	220
(b) PG Programs		
M.A./M.Sc. (Previous)	50	15+60=75
M.A./M.Sc. (Final)	50	75

Apart from regular teaching programs there is a provision for remedial teaching to help students in solving their problems related to their courses of study. The department conducts regular seminars/workshops for PG students to introduce them to the emerging areas of Mathematics and to initiate them into research in Mathematics.

## COURSE COMPASS

### B.A./B.Sc. I

- First Paper : Matrices, Trigonometry and Vector Analysis
- Second Paper : Calculus (Differential Calculus and Integral Calculus)
- Third Paper : Geometry of Two and Three Dimensions

### B.A./B.Sc. II

- First Paper : Higher and Abstract Algebra
- Second Paper : Differential Equations
- Third Paper : Statics and Dynamics

### B.A./B.Sc. III

#### (a) Compulsory Papers

- First Paper : Linear Algebra and Linear Programming
- Second Paper : Analysis (Real Analysis and Complex Analysis)

## **(b) Optional Papers**

- Third Paper (i) : Numerical Analysis  
Third Paper (ii) : Mathematical Statistics  
Third Paper (iii) : Spherical Trigonometry and Astronomy  
Third Paper (iv) : Principles of Computer Science and I.T.

## **M.A./M.Sc. (Previous)**

- First Paper : Advanced Analysis (Measure Theory Integration and Real Analysis)  
Second Paper : Differential Geometry & Modern Algebra  
Third Paper : Geometry of Two and Three Dimensions Fluid Dynamics  
Fourth Paper : Tensor Calculus & Dynamics of Rigid Bodies

## **M.A./M.Sc. (Final)**

### **Compulsory Papers**

- First Paper : Linear Algebra and Complex Analysis  
Second Paper : Topology

Third and Fourth Papers are optional papers. Students will have to select any two papers out of thirteen papers:

- i. Ballistics
- ii. Electricity & Magnetism
- iii. Elasticity
- iv. Functional Analysis
- v. Theory of Numbers
- vi. Mathematical Statistics
- Vii. Modern Algebra
- viii. Relativity
- ix. Riemannian Geometry
- x. Cosmology
- xi. Special Functions and Partial Differential Equations
- xii. Discrete Mathematics
- xiii. Operations Research

Paper Fifth : Viva-Voce

## PUBLICATIONS OF FACULTY MEMEBRS IN LAST THREE YEARS

1. L. M. Upadhyaya and H. S. Dhama (2007). A Note on an Exton's Generalized Quadruple Hypergeometric Function of Matrix Arguments. Vikram Mathematical Journal, Vol 27, 137-144.
2. Rakesh Pandey & H S Dhama(2007) Generation of Hilbert and metric spaces for the demonstration of linguistic variations, Paper presented and to be published in the Proceedings of the XII<sup>th</sup> annual Conference of the Gwalior Academy of Mathematical Science
3. Raj Kishore Bisht & H S Dhama (2007) Extracting collocations from a small sample of text, Paper presented and to be published in the Proceedings of the XII<sup>th</sup> annual Conference of the Gwalior Academy of Mathematical Sciences.
4. Raj Kishor Bisht & H S Dhama (2008) On some properties of content words in a document, In Proceedings of the 6<sup>th</sup> Annual CISTM conference, July 31-August 2, 2008; IIT Delhi, India, 51-1-51-19.
5. Rakesh Pandey & H S Dhama (2008) Conversion of Imperative sentences from active to passive voice by topological homeomorphism, Accepted for oral presentation in World Congress on Science and Technology, held at Heidelberg, Germany during Sept.24-26,2008 and publication in Proceedings of the World Academy of Science, Engineering and Technology, Vol.34, September 2008.
6. Raj Kishor Bisht, H. S. Dhama (2008) The Application of Fuzzy Logic to Collocation Extraction [CoRR abs/0811.1260](https://arxiv.org/abs/0811.1260)
7. Rakesh Pande & H S Dhama (2009) Mathematical Model for Transformation of Sentences from Active Voice to Passive Voice, [arXiv:0903.5168v1](https://arxiv.org/abs/0903.5168v1) [cs.CL]
8. Hemlata Pande & H S Dhama (2009). Generation of a model for Grapheme frequencies and its refinement and validation by Group Theoretic aspects. Journal of Quantitative linguistics, Volume 16, Number 4, pp.307-326.
9. Sumit Khulbe, Richanshu Sharma and H.S.Dhama (2009), Mathematical formalism and computer program for tense conversion in English Grammar, International Transactions in Mathematical Sciences and Computer; July-December 2009, Volume 2, No. 2, pp. 307-317.
10. Sumit Khulbe, Rakesh Pande and H.S.Dhama, Mathematical formulation and Development of computer program for active to passive voice conversion, Accepted for publication in the Vol.1, No.3 issue of the Journal "International Transactions in applied Sciences.
11. Rakesh Pandey, M. M. S. Rauthan and H. S. Dhama(2009) Modelling of parts of speech patterns and exhibition of relation between stylistic patterns of different writers ,Accepted for presentation in the International Conference on Current trends in Mathematics-2009 (ICCTM-2009).
12. Rakesh Pande and H. S. Dhama(2009). Conversion of imperative sentences from active to passive voice by topological homeomorphism. In L. Ramamoorthy and J.R. Nirmala (Eds.) Papers Presented in the All-India Conference on Multimedia Enhanced Language Teaching –MELT 2009, Language in India 9: 11, November 2009, 545-552.

13. Hemlata Pande and H. S. Dhami (2009). Analysis And Mathematical Model Generation For Letter Frequencies In Text And In Word's Initials For Hindi language And Measurement Of Entropies Of Most Frequent Consonants. (Abstract). Powerpoint Presentation available at:  
[http://www.sconli.org/SCONLI3/SCONLI\\_presentation/Hemlata.ppt](http://www.sconli.org/SCONLI3/SCONLI_presentation/Hemlata.ppt)
14. Hemlata Pande and H. S. Dhami (2010). Distributions of different parts of speech in different parts of a text and in different texts. The modern journal of applied linguistics, MJAL2:1JANUARY2010, 152-170.
15. Hemlata Pande and H. S. Dhami (2010). Mathematical Modeling of Occurrence of Letters and Word's Initials in Texts of Hindi Language. Accepted for publication in SKASE Journal of Theoretical Linguistics, Vol. 7 2010. (e-journal)
16. J. Upreti & S. Lal (2007) On H-Projectively Flat KH-structure submanifold, Journal of Tensor Society of India, Vol. 1, 2007, pp: 41-49.
17. J. Upreti, S. Lal & V.D. Tripathi (2008) On Generalised Non-Invariant Hypersurfaces of Kenmotsu Manifold, Indian research Journal of Social Sciences, Vol. 14, No. 1, pp: 176-178.
18. J. Upreti & S.K. Chanyal (2008) A Semi symmetric Non-Metric Sp-Connexion in an LSP-Sasakian Manifold, Journal of National Academy of Mathematics, India, DDU Gorakhpur University, Vol. 22 , pp. 1-10.
19. J. Upreti (2008) Complete lift of  $F_a(K,1)$  structure in the tangent bundle, Demonstratio Mathematica, Warszawa, Poland, Vol. XLI, No. 4, pp. 915-920.
20. Neeraj Pant, R.N. Mehta & B.C. Tewari, Relativistic model of radiating massive fluid sphere, Astrophys Space Sci. DOI 10. 1007/s 10509-010-0320-3.
21. S.B. Pandey, Meenakshi Pant & Savita Patni(2009) On n-recurrent HGF-structure metric manifold by Journal of Tensor Society, Vol. 23, 79-104

### PROJECTS UNDERTAKEN BY THE FACULTY MEMBERS:

Name of the teacher	Title of the project	Duration	Funding Agency	Amount
Prof. H.S. Dhami	Mathematical Analysis of Kumauni Language		NCERT, New Delhi	
Prof. H.S. Dhami	Mathematical Modelling and functional analysis of village eco-system with special reference to Kumaun Himalayas	2002-05	G.B. Pant Institute of Himalayan Environment & Development, Kosi , Katarmal, Almora	Rs. 5,63,200.00 (Revised amount of initial sanction of Rs. 4.00.000.00)
Prof. H.S. Dhami	Mathematical formalism and development of computer programme for English grammar	2009-2012	University Grants Commission Bahadur Shah Zafar Marg, New Delhi	6 Lacs

### **LIST OF FACULTY MEMEBERS WITH THEIR RESEARCH FIELDS OF INTEREST:**

<b>Name</b>	<b>Designation</b>	<b>Research Interests</b>
1. Prof. H.S. Dhami	Professor & Head	Mathematical Modelling, Mathematical Linguistics, Applications of Special Functions
2. Prof. C.S. Bisht	Professor & Campus Head, DSB Campus	Number Theory
3. Prof. R. P. Pant	Professor	Analysis
4. Prof. V.P. Pande	Professor	Mathematical Statistics/Analysis
5. Prof. M.C. Joshi	Professor	Analysis
6. Prof. Jaya Upreti	Professor	Differential Geometry
7. Dr. Ratna U. Joshi	Associate Professor	Differential Geometry
8. Dr. Asha Srivastava	Associate Professor	Differential Geometry
9. Dr. B.C. Tewari	Associate Professor	Relativity and Cosmology
10. Sri Sunil K. Chanyal	Assistant Professor	Differential Geometry
11. Km. Savita Patni	Teaching Personnel	Differential Geometry
12. Sri. Mahendra Kumar	Teaching Personnel	Differential Geometry

### **CONTACT NUMBERS OF THE FACULTY MEMBERS:**

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