SHANTANU SHARMA
CURRICULUM VITÆ

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University of North Carolina School of Medicine
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Education

2004-Present: **Doctor of Philosophy,** Biochemistry & Biophysics,
Emphasis in Bioinformatics & Computational Biology, and
Emphasis in Molecular & Cellular Biophysics,
University of North Carolina at Chapel Hill, NC, USA

2000-2004: **Bachelor of Technology**, Computer Science & Engineering,
Research Focus: Bioinformatics, Data Mining, Algorithms
Indian Institute of Technology, Kanpur, India

Professional Experience

3/2007–Present: NIH Integrated Biomedical Research Fellow,
University of North Carolina at Chapel Hill, NC USA

2006–Present: Graduate Training Advisory Committee Member, *Training Initiative in Biomedical and Biological Sciences, University of North Carolina, Chapel Hill, NC USA*

2006–Present: Member of the Board & Communications Executive, *Carolina Student Biotechnology Network, Chapel Hill, NC, USA*

7/2007–8/2007: Summer Intern, National Biomedical Computation Resource,
University of California at San Diego, CA USA

8/2004–7/2006: UNC Molecular & Cellular Biophysics Research Fellow,
University of North Carolina at Chapel Hill, NC, USA

2/2005–5/2005: Bioinformatics & Biophysics Graduate Research Rotation,
Laboratory of Dr. Nikolay V Dokholyan, Dept. of Biochemistry & Biophysics
University of North Carolina at Chapel Hill, NC, USA

11/2004–2/2005: Bioinformatics and Biophysics Graduate Research Rotation,
Laboratory of Dr. Brian Kuhlman, Dept. of Biochemistry & Biophysics
University of North Carolina at Chapel Hill, NC, USA

8/2004–11/2004: Bioinformatics and Biophysics Graduate Research Rotation,
Laboratory of Dr. Charles W Carter Jr., Dept. of Biochemistry & Biophysics
University of North Carolina at Chapel Hill, NC, USA

3/2004–5/2004:	Lecturer, Summer Course in Data Structures & Algorithms, *Indian Institute of Technology, Kanpur, India*
4/2003–1/2004:	Undergraduate Research Intern, BioGeometry Project, *Laboratory of Dr. Charles W Carter Jr., Dept. of Biochemistry,* *University of North Carolina at Chapel Hill, NC, USA*
11/2002–1/2003:	Bioinformatics Research Fellow, Dr. R. Sowdhamini Lab, *National Center for Biological Sciences, Bangalore, India*
4/2002–7/2002:	Summer Research Scholar, Computational Mathematics Laboratory, Mentored by: Dr. Narendra K Karmarkar *Tata Institute of Fundamental Research, Pune, India*
4/2001–7/2001:	Web Developer, Association for Computing Activities, Mentored by: Dr. Pankaj Jalote *Indian Institute of Technology, Kanpur, India*

Honors and Awards

2007:	National Biomedical Computation Resource Summer Fellowship.
2007:	TeraGrid Resource Award for Multiscale Simulations of Biomolecular Dynamics.
2007:	*Worldwide Software Developers Conference Scholarship 2007* (WWDC07), Apple Inc.
2007:	American Society for Biochemistry & Molecular Biology Travel Fellowship to present research at the *Experimental Biology 2007* and *ASBMB Annual Meeting 2007*.
2007:	American Association for the Advancement of Science, Nominated Member, Program for Excellence in Science, Awarded subscription to journal *Science*.
2007–Present:	National Institutes of Health Integrated Biomedical Research Training Program (IBRTP) Fellowship.
2004–2006:	National Institutes of Health Molecular & Cellular Biophysics Graduate Research Fellowship.
2004:	Honorarium equivalent to $1,000 by Department of Computer Science & Engineering, Indian Institute of Technology Kanpur for lecturing in IIT Kanpur Algorithms' Summer School 2004.
2003–2004:	Award equivalent to $10,000 by Annual Class of 1976 IIT Kanpur Alumni Funds Competition for research towards a microcontroller-based prepayment energy meter.
2003–2004:	BioGeometry Project Undergraduate Research Award ($10,000), mentored by Dr. CW Carter Jr., Dr. JM Roach, Biochemistry & Biophysics, University of North Carolina.

2000:	Gold Medal in Indian National Physics Olympiad 2000, awarded to top 30 students from >30,000 candidates in India. Attended the International Physics Olympiad Training Camp, Homi Bhabha Center for Science Education, Mumbai, India.
2000:	Silver Medal and fellowship equivalent to $4,000 for securing 64th rank (among 1,50,000 candidates) in *Indian Institutes of Technology Joint Entrance Examination 2000*, FIITJEE Ltd, New Delhi and Apex Academy, Mumbai, India.
2000:	Fellowship equivalent to $1,000 for securing 5th rank (among 1,50,000 candidates) in *MP State Level Pre-Engineering Test 2000*, Professional Examination Board, Bhopal, India.
2000:	Awarded Certificate of Merit for outstanding performance in the *Indian National Chemistry Olympiad 2000* by the Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, Mumbai, India.
1998:	Fellowship equivalent to $1,000 for securing first merit rank (among >50,000 candidates) in State-Level Senior Science Competition, MP Council of Science & Technology, Bhopal, India.
1998-2004:	Indian National Talent Search Scholarship; Awarded to top 1% of 50,000 candidates by National Council for Educational Research & Training, New Delhi, India.
1998-2000:	Awarded Merit Certificate by the *Central Board of Secondary Education* for outstanding academic performance (top 0.1%) in Mathematics (*10th grade, 1998*), Physics (*12th grade, 2000*).
1998-1999:	Awarded Merit Certificate for meritorious performance in the *National Mathematics Olympiad Contest* by the *Delhi Association of Mathematics Teachers* at junior (1998) and intermediate (1999) levels.

Bibliography

A. Books and chapters

1. J. R. McCann, **S. Sharma**, B. Hamel, J. T. Brown, "Carolina Student Biotechnology Network." *Best Practices in Biotechnology Education* 335-342 Editor: Dr. Yali Friedman, Logos Press (2008).

B. Refereed Journal Publications (Hirsch-Index: 5, >75 Citations)

2. **S. Sharma**, F. Ding, N. V. Dokholyan, "iFoldRNA – ab initio RNA folding and tertiary structure prediction." *Bioinformatics* 24(17):1951-2 (2008).

3. F. Ding, **S. Sharma,** P. Chalasani, V. V. Demidov, N. E. Broude, N. V. Dokholyan "Ab initio RNA folding by discrete molecular dynamics: from structure prediction to folding mechanisms." *RNA* 14(6):1164-73 (2008).

4. **S. Sharma,** F. Ding, N. V. Dokholyan, "Probing Protein Aggregation using Discrete Molecular Dynamics." *Frontiers in Bioscience,* 13:4795-808 (2008).

5. **S. Sharma,** N. V. Dokholyan, "DNA Sequence Mediates Nucleosome Structure and Stability." *Biophysical Journal,* 94(1): 1-3 (2008).

6. **S. Sharma**, P. Gong, B. Temple, D. Bhattacharyya, N. V. Dokholyan and S. G. Chaney "Molecular dynamic simulations of cisplatin- and oxaliplatin-d(GG) intrastand cross-links reveal differences in their conformational dynamics." *Journal of Molecular Biology* 373(5):1123-40 (2007).

7. **S. Sharma***, Y. Chen*, F. Ding*, H. Nie*, A. W. Serohijos*, K. Wilcox*, S. Yin*, N. V. Dokholyan* "Protein Folding: Then and Now." *Archives of Biochemistry and Biophysics* 1;469(1):4-19 (2008). *(*Equal contribution)*

8. **S. Sharma**, F. Ding, and N. V. Dokholyan, "Multiscale modeling of nucleosome dynamics." *Biophysical Journal*, 92: 1457-1470 (2007).

9. **S. Sharma**, F. Ding, H. Nie, D. Watson, A. Unnithan, J. Lopp, D. Pozefsky, N. V. Dokholyan, "iFold: A platform for interactive folding simulations of proteins." *Bioinformatics*, 22: 2693-2694 (2006).

10. K. Bloom, **S. Sharma**, and N. V. Dokholyan, "The path of DNA in the kinetochore" *Current Biology*, 16, R276-R278 (2006).

11. J. Roach, **S. Sharma**, M. Kapustina, C. W. Carter Jr. "Structure alignment via delaunay tetrahedralization." *Proteins: Structure, Function, and Bioinformatics* 60(1):66-81 (2005).

B. Refereed Conference Publications

12. **S. Sharma**, V. Choudhary, R. K. Ghosh. "AAB: A generalized java-based algorithm animator builder." *Proceedings of the Fifth International Conference of Information Technology (CIT-2002)* Tata McGraw Hill, ISBN: 0070499926 (2002).

C. Technical Reports

13. **S. Sharma**, S. Biswas, "A novel approach to structural comparison of proteins." *Technical Report, Undergraduate Thesis, Department of Computer Science and Engineering, IIT Kanpur* (2004).

14. **S. Sharma***, N. Kumar*, "Independent component analysis in real and complex Fourier space: an application to videos and natural scenes." *Technical Report, CS698 – The Computational Brain, Department of Computer Science and Engineering, IIT Kanpur (2004). (*Equal contribution)*

15. **S. Sharma***, N. Gupta*, A. Mukherjee, "An active appearance model based face recognition system." *Technical Report on Special Topics in Computer Science, IIT Kanpur (2003). (*Equal contribution)*

16. **S. Sharma***, M. S. Apurva*, R. K. Ghosh, "Neural network applications in sensor fusion." *Technical Report on Mobile Computing, IIT Kanpur (2003). (*Equal contribution)*

17. **S. Sharma***, N. K. Dahra*, S. K. Aggarwal, "PVM, MPI and OpenMP: A Comparison and Suitability for Various Architectures." *Technical Report on Advanced Compiler Optimizations, IIT Kanpur (2004).*

D. Media Coverage

1. "Playing hard balls with RNA: fully automated ab initio RNA folding by discrete molecular dynamics." *Drug Discovery Today 2008.*

2. "ITS supports iFold protein folding endeavor." *University of North Carolina ITS in Review 2006.*

E. Abstracts (Invited/Contributed)

9/2008: **S. Sharma**, N. V. Dokholyan, "Exploring core histone residues mediating chromatin stability." *2008 Annual UNC Biophysics Graduate Research Forum,* Chapel Hill, NC, USA.

3/2008: **S. Sharma**, N. V. Dokholyan, "Engineering Site-Directed Mutagenesis in Nucleosomes to Probe in vivo Chromatin Stability." *Institute of Biological Engineering Annual Conference 2008.* Chapel Hill, NC, USA.

1/2008: **S. Sharma**, N. V. Dokholyan, "Understanding Chromatin Dynamics: Modeling and Rational Design." *UNC Bioinformatics & Computational Biology Colloquium 2008.* Chapel Hill, NC, USA.

10/2007: **S. Sharma**, L. Vogel, B. D. Strahl, N. V. Dokholyan, "Role of Conserved Histone Core in Nucleosome Stability." *2nd Annual Atlantic Coast Chromatin Conference 2007.* Chapel Hill, NC, USA.

9/2007: **S. Sharma**, N. V. Dokholyan, "Structural Organization and Dynamics of the Kinetochore." *2nd Annual Duke Systems Biology Symposium 2007.* Durham, NC, USA.

9/2007: **S. Sharma**, N. V. Dokholyan, "Simulations Probing Mechanisms of Anticancer Drugs." *2007 Annual UNC Biophysics Graduate Research Forum*, Chapel Hill, NC, USA.

8/2007: **S. Sharma**, N. V. Dokholyan, "Investigating protein dynamics using multiscale simulations." *2007 Annual UNC Biochemistry & Biophysics Research Retreat*, Chapel Hill, NC, USA.

8/2007: **S. Sharma**, N. V. Dokholyan, "iFold – web-based multiscale modeling of protein dynamics." *2007 Annual UNC Bioinformatics and Computational Biology Research Seminar*, Chapel Hill, NC, USA.

8/2007: **S. Sharma**, F. Ding, N. V. Dokholyan, "Integrating multiscale modeling and simulations with scalable high performance computation." *2007 Annual Symposium of the National Biomedical Computation Resource Summer Institute,* University of California at San Diego, La Jolla, CA, USA.

7/2007: **S. Sharma**, N. V. Dokholyan, "Modeling chromatin structure and dynamics." *2007 Annual UNC Biochemistry Summer Seminar Series*, Chapel Hill, NC, USA.

5/2007: **S. Sharma**, N. V. Dokholyan, "Nucleosome dynamics *in silico* – role of DNA and histone tails." *98th Annual Meeting of the American Society for Biochemistry & Molecular Biology 2007*, Washington DC, USA, *The FASEB Journal 2007;21:516.1*.

4/2007: D. Bhattacharyya, C. L. King, **S. Sharma**, B. Temple, S. L. Campbell, S. G. Chaney, "Effect of sequence context in platinum-DNA structure." *98th Annual Meeting of the American Association for Cancer Research*, Los Angles, USA, *AACR Proceedings 2007:* 3166.

3/2007: **S. Sharma**, F. Ding, N. V. Dokholyan, "Discrete molecular dynamics studies of nucleosomes." *51st Annual Meeting of the Biophysical Society 2007*. Baltimore, MD, USA, *Biophys. J. 2007: 15a.*

11/2006: **S. Sharma**, N. V. Dokholyan, "Histone variants and tail dynamics in chromatin organization." *6th Biennial Carolina Biophysics Symposium 2006.* Chapel Hill, NC, USA.

9/2006: **S. Sharma**, N. V. Dokholyan, "Structural dynamics of a nucleosome." *1st Annual Duke Systems Biology Symposium 2006.* Durham, NC, USA.

9/2006: **S. Sharma**, K. S. Bloom, N. V. Dokholyan, "Structure and dynamics of centromere specific nucleosomes." *1st Annual Atlantic Coast Chromatin Conference 2006.* Chapel Hill, NC, USA.

7/2005: T. J. James, **S. Sharma**, N. V. Dokholyan, "Comparing unfolding and folding pathways for Eglin C, SH3, and Chymotrypsin Inhibitor-2." *Annual Meeting of the Partnership for Minority Students in Biomolecular Sciences 2005* (Sponsored by the Howard Hughes Medical Institute). Chapel Hill, NC, USA.

7/2004: A. Kim, **S. Sharma**, J. Roach, C. W. Carter Jr., "Multiple sequence and structure alignments" *International Conference on Aminoacyl-tRNA Synthetases: Ancient Molecules for Future Biology and Medicine*. Seoul, Korea.

Research Grant-writing Experience

1. National Institutes of Health Grant on project iFold (2007) – high priority score.
2. North Carolina Biotechnology Center Grant on chromatin research (2006) – funded in full.
3. National Institutes of Health Grant on chromatin research (2006) – high priority score.
4. National Institutes of Health Grant on computer architectures for simulations – high priority score.

Teaching Record

A. Classroom teaching

5/2007–5/2007: Invited Lecturer, Biochemistry Comprehensive Examination Study Group
Class of 20 graduate students, Department of Biochemistry & Biophysics, UNC Chapel Hill.

2/2007–2/2007: Invited Lecturer, Integrated Biomedical Research Seminar
Class of 40 undergraduate students, Department of Biology, UNC Chapel Hill.

9/2005–11/2005: Teaching Assistant, Macromolecular Structure and Dynamics
Class of 20 graduate students, Department of Biochemistry & Biophysics, UNC Chapel Hill.

4/2004–7/2004: Course Instructor, Summer Course in Algorithms and Data Structures, *Class of 60 undergraduate and graduate students, Department of Computer Science & Engineering, IIT Kanpur.*

10/2003–10/2003: Lecturer, Lectures on Scientific Computing using Linux, *Class of 100 Undergraduate/Graduate Students, Department of Computer Science & Engineering, IIT Kanpur.*

B. Graduate and undergraduate students collaborated

2006–Present: Srinivas Ramachandran,
Graduate Research Assistant,
UNC Department of Biochemistry & Biophysics

2006–Present: Douglas Tsao,
Graduate Research Assistant,
UNC Department of Chemistry

2007–Present: Pradeep Kota,
Graduate Research Assistant,
UNC Department of Biochemistry & Biophysics

2008–Present: Elizabeth Proctor,
Graduate Research Assistant,
UNC Department of Biochemistry & Biophysics

2008–Present: Stephen Bush,
Graduate Research Assistant,
UNC Department of Biochemistry & Biophysics

2008–Present: Sai Phanindra,
Graduate Research Assistant,
UNC Department of Biochemistry & Biophysics

2007–Present: Sunny Darji,
Undergraduate Research Assistant,
UNC Department of Chemistry

2007–Present: Lisa Vogel,
Undergraduate Summer Intern,
UNC Integrated Biomedical Research Training Program

2007–Present: Adrian J. Randall,
Undergraduate Research Fellow,
UNC Department of Chemistry

2006–2007: Tamara J. James,
Bachelor of Science Thesis; Senior Year Research,
Johnson C. Smith University Department of Natural Sciences

2005–2006: Daniel Watson, Aditya Unnithan, Jameson Lopp

	iFold – Undergraduate Software Engineering Project, UNC Department of Computer Science & Engineering
2005–2006:	Tamara J. James, Summer Undergraduate Research Intern, Partnership for Minority Advancement in the Biomolecular Sciences (Sponsored by the Howard Hughes Medical Institute)
2001–2004:	Vivek Mishra, Akshat Jain, Hara Kishore Rai, Sharad Shrivastava, Sai Pritham, Zulfikar Ali Undergraduate Students, Indian Institute of Technology Kanpur (Mentored under IIT Kanpur Students' Counseling Program)

Professional Services

2007:	Chair, Platform session on Chromatin, *51st Annual Meeting of the Biophysical Society*, Baltimore, MD, USA.
2008–Present:	Molecular Systems Biology, Manuscript Reviewer.
2008–Present:	Genome Biology, Manuscript Reviewer.
2007–Present:	Journal of Chemical Theory and Computation, Manuscript Reviewer.
2006–Present:	Journal of Molecular Biology, Manuscript Reviewer.
2006–Present:	Biophysical Journal, Manuscript Reviewer.

Professional & Academic Affiliations

2007–Present:	International Society for Computational Biology *La Jolla, CA USA (http://www.iscb.org).*
2006–2008:	Member of the Board and Communications Executive, Carolina Student Biotechnology Network *Chapel Hill, NC USA (http://www.carolinabiotech.org).*
2006–2008:	Member of the Graduate Training Advisory Committee, Training Initiative in Biomedical and Biological Sciences *Chapel Hill, NC USA (http://www.unctibbs.org).*
2002–Present:	Association for Computing Machinery *New York, NY USA (http://www.acm.org).*
2006–2008:	Biophysical Society *Bethesda, MD USA (http://www.biophysics.org).*
2006–2008:	American Chemical Society *Washington, DC USA (http://www.acs.org).*

2006–2008:	The Epigenetics Society *Gainesville, FL, USA (http://www.dnamethsoc.com).*
2005–2007:	Student Developer, Apple Developer Connection, Apple Inc. *Cupertino, CA USA (http://www.apple.com).*
2007–Present:	Nominated Member, Program for Excellence in Science, American Association for the Advancement of Science, *Washington, DC USA (http://www.aaas.org).*
2004–Present:	Member, IIT Kanpur Alumni Association *IIT Kanpur, India (http://www.iitkalumni.org).*
2003–2004:	Executive Coordinator, Gymkhana Computing Services *IIT Kanpur, India (http://students.iitk.ac.in/gymkhana).*
2002–2003:	President, Association for Computing Activities *IIT Kanpur, India (http://www.cse.iitk.ac.in/users/aca).*
2002–2003:	Coordinator, Science & Technology Council's Development Team, *IIT Kanpur, India (http://students.iitk.ac.in/gymkhana).*
2002–2003:	Coordinator, Public Relations Cell, Students' Gymkhana *IIT Kanpur, India (http://antaragni.iitk.ac.in).*
2001–2002:	Students' Guide and Counselor, Undergraduate Counseling Service, *IIT Kanpur, India (http://www.iitk.ac.in/counsel).*
1999–2000:	Head Boy, *Delhi Public School, Bhilai, India (http://www.dpsfamily.org).*
1998–1999:	House Prefect, Jhelum, *Delhi Public School, Bhilai, India (http://www.dpsfamily.org).*

Relevant Coursework

A. Doctoral Level (⇒ Course audited)*

Biochemistry, Molecular Biology

Enzyme Mechanisms & Regulation	Advanced Biochemistry Lab-I
Case Studies in Structural Biology	Molecular Biology*
Research Topics in Biochemistry	Scientific Writing
Seminar in Biochemical Research	Advanced Molecular Biology*
RNA Structure, Function & Technology	Advanced Biochemistry Lab-II

Biophysics

Macromolecular Thermodynamics	Macromolecular Equilibria
Macromolecular Structure & Dynamics	Macromolecular Principles
Thermodynamics & Statistical Mechanics	Nuclear Magnetic Resonance
Macromolecular Spectroscopy	NMR Laboratory Practices
Physical Chemistry of Polymers	Seminar in Biophysics
Simulations of Biomolecular Dynamics	Macromolecular Interactions

Bioinformatics & Computational Biology

Computational Biology Colloquium	Biomolecular Informatics
Algorithms for Sequence Analysis	Databases for Bioinformatics
Sequence Analysis: Theory & Methods	Data Mining & Biol. Information
Biostatistics in Bioinformatics	Mathematical Cell Modeling

B. Undergraduate Level (⇒ Course Audited)*

Computer Science

Fundamentals of Computation	Introduction to Algorithms
Data Structures	Operating Systems
Programming Tools & Techniques	Computer Organization
Programming Language Principles	Computer Networks*
Principles of Database Systems	Mobile Computing
Principles of Compiler Design	Discrete Mathematics
Advanced Compiler Optimization	Theory of Computation
Bachelor of Technology Thesis Project	Knowledge Discovery
Special Topics in Computer Science	Software Engineering

Biophysics and Bioinformatics

Bioinformatics & Computational Biology	Cell and Molecular Biology
Structural Biology and Biophysics	The Computational Brain

Mathematics, Physics and Chemistry

Mathematics-I (Engineering Calculus)	Mathematics-II (Matrix Theory)
Mathematics-III (Differential Calculus)	Linear Algebra
Physics-I (Statics and Dynamics)	Physics-II (Electrodynamics)
Advanced Physics Laboratory	Order and Chaos in Nature
Advanced Chemistry Laboratory	General Chemistry
Quantum Physics	Thermodynamics

Engineering

Computational Methods In Engineering	Environmental Engineering
Manufacturing Processes	Engineering Graphics
Electronic Circuits, Instrumentation	Engineering Mathematics

Economics, Philosophy

Introduction to Economic Analysis	Introduction to Logic
Economic Development & Planning	Responsible Dissent