Asif Mushtaq

Associate Professor of Mathematics

PERSONAL DETAILS:

- Nationality: Norway
- Marital Status: Married
- Children: 3
- Home: Rundhaugen 28, 8023, Bodø

- Mobile: 0047-40954847
- Email: asif.mushtaq@nord.no
- Personal webpage: www.asifmushtaq.no

PROFESSIONAL SUMMARY:

Working as Associate Professor of Mathematics at Nord university Bodø since September 2016. I have more than 13 years teaching experience in Norway at my credit with the exposure of Pakistan in professional pedagogical education. Very passionate, progressive, ambitious and goal-driven teacher and researcher who has been educating undergraduates and postgraduates in the field of mathematics, mathematics education and statistics. Published many publications in different prestigious journals primarily in the field of applied mathematics and physics.

CORE SKILLS:

- Applied Mathematics
- Differential equations and Numerical analysis,
- Geometric numeric integrators,

- Mathematics Education,
- Digitalization in teacher education.
- Programming in schools
- Statistics,

- Wind energy forecasting,
- Data analysis,
- Fluid mechanics

WORK EXPERIENCE:

Associate Professor of Mathematics   September 2016– Present

Seksjon for matematikk, Fakultet for lærerutdanning, kunst og kultur (FLU), Nord Universitet Bodø Norway
Key Responsibilities:
- Responsible of different courses Teaching process to bachelor and master level mathematics course MAGLU(1-7) and MAGLU(5-10). Detailed description is available in pedagogical skill sections.
- Research and development: Leading programmering i skolen project.
  Details are available in project sections.
- Supervisor of master´s thesis and FoU students.
- Will resume responsibilities as Section leader/coordinator in May 2021
- Curriculum contents development for mathematical courses.
- Working on EU-project iTEM in collaboration with Liberec University, Czech Republic.

Post-Doctorate   July 2016– August 2016

Sintef ICT, Applied Mathematics, Trondheim Norway
Key Responsibilities:
- Worked on waves in ocean and coastal waters
- uniCQue: uncertainty reduction in monitoring methods for improved CO_2 Quantity estimation (A project with SINTEF Petroleum)

Post-Doctorate/Research Scientist   September 2014– June 2016

Institute of Mathematical Sciences, NTNU, Trondheim Norway
Lecturer: MA2501 Numerical methods.
Key Responsibilities:
- Taught to the master´s students
- Responsible for programming research project work and assignments
- Grade the exams, assignments and projects
- Maintain the course webpage
- Worked on Geometric numerical integration project

Research Scientist

SINTEF ICT, Applied Mathematics, Trondheim Norway   March 2014 – September 2014

Industry partners: Statoil, WindSIM, TrønderEnergie
Research partners: Norwegian Meteorological Institute, NTNU.
Wind energy resource assessment

Research Scientist
Institute of Mathematical Sciences, NTNU, Trondheim   September 2012 – December 2013
Development of higher order integrators (HOI) for Hamiltonian
Development of Python program for automatic numerical code generation for HOI

Lecturer in Mathematics   February 2005-November 2008
University of Education, Township Campus, Lahore Pakistan
UE is the first specialized university in the education sector of Pakistan. The main goal of this
university is to produce the better future teachers and leaders.
  - Taught to master and graduate classes
  - Took part in development of graduate and undergraduate mathematics courses curriculum with other
    administrative duties

Tutor of Mathematics   March 2003 – February 2005
Virtual University of Pakistan
VU is a unique university of Pakistan that provides the distant learning to students through the developed VULMS
system.
Key Responsibilities:
  - Online tutoring to graduate courses like Calculus I, II, III, Discrete mathematics, ODEs
  - Monitoring online discussion boards
  - Marking, and marking assignments and exams through VULMS systems.

Lecturer in Mathematics   August 2002 – March 2003
Government of the Punjab, Pakistan
  - Taught to undergraduate and high school classes

FORMAL EDUCATION:
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Ph.D. in Mathematical Sciences   August 2010 – November 2014
Institute of Mathematical Sciences, NTNU, Trondheim Norway
Thesis: Higher order integrators for Hamilton´s equations: Modified Symplectic Algorithms.

M.Phil. in Applied Mathematics   2006 – 2009
Government College University, Lahore Pakistan
Thesis: Some finite difference methods for two-dimensional elliptic equations
 Skill acquired: CFD, finite difference methods, numerical methods for solving ODEs.

M.Sc. in Computational Mathematics and Statistics   1998 – 2000
University of the Punjab, Lahore Pakistan

B.Sc. in Mathematical Sciences and Statistics   1996 – 1998
University of the Punjab, Lahore Pakistan

Intermediate (General Sciences)   1994 – 1996
Govt. Islamia College Civil Lines, Lahore Pakistan
Courses: Mathematics, Statistics, Economics, Islamic and Social studies, English, Urdu

Matriculation (Science Subjects)   1992 – 1994
Lahore Board, Pakistan
Courses: Mathematics, Physics, Biology, Chemistry, Islamic and Social studies, English

PROFESSIONAL EDUCATION:
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University level teaching mathematics course   November 2015—June 2016
MatRIC: Centre for Research, Innovation and Coordination of Mathematics
It is the certificate course for recently appointed university/university college mathematics teachers and learners
arranged by MatRIC/**University of Adgar in collaboration with the NTNU.** It is designed to address many of the

challenges for mathematics teachers (learner) and this can be used in partial fulfillment of the requirements of many universities and university colleges for teaching staff to undertake professional development in university pedagogy.

Professional Teacher Education (B.Ed.; Bachelor of Education)   2001– 2002
University of the Punjab, Lahore Pakistan
Its one-year professional teaching diploma. **Got recognition from NOKUT**.
Specialization: General and Mathematical sciences

Mathematical Tools for Research, using R
Nord University Bodø   3-7 April, 2017
It covers the fundamentals of Mathematics (functions, linear algebra, calculus and optimization); focusing on the understanding of the concepts. A crucial aspect of this workshop is the active use of the open-source programming language R.

In Service Pedagogical Trainings
University of Education, Lahore   2005- 2006
Teacher training programs offered by different institutions on and after the appointment as lecturer at University of Education Lahore to improve teaching skills at university level:

- Art & Craft: 2 weeks (2005) intensive teacher training program offered by the Education university
- ICT for All: 3 days (2005) teacher training program offered by the Provincial Institute of Teacher Education, Punjab (PIET)
- Certificate on Semester System: One day workshop (2006) offered by the Higher Education Commission of Pakistan (HEC)

PROJECTS:
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- **European-project: iTEM - improve Teacher Education in Mathematics** in collaboration with institution, Technical University of Liberec, Czech Republic (approx.., 58 000 EUR)
- Project Leader: Programmering i skolen (Matematikkundervisning og -læring)- Nord Universitet.
- mv2me: Move to me project (European project) with Theoretical physics department NTNU, Norway and Brno university of Technology, VUTBR, Czech Republic.
- uniCQue: uncertainty reduction in monitoring methods for improved CO_2 Quantity estimation (A project with SINTEF Petroleum)
- Worked on extensions of Symplectic integrators. Applied to different physical system.
- Developed a mechanism for automatic numerical implementation in Python.
- Wrote a tutorial of our developed code generating program HOMsPy (Higher Order Methods in Python)
- Worked with SINTEF applied mathematics on statistical analysis of wind resource components.

OTHER PROFESSIONAL ACTIVITIES:
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- Sensor (external and internal examiner) master theses and reports in Norwegian University of Science and Technology (NTNU, Trondheim) and Nord university:
  - Thesis topic "SDElib: Creating, solving and analyzing stochastic differential equations: A program written in Python 3.5" (01-12-2017), Mathematics department, Per Vinje Hauan.
  - Thesis topic "Numerical Modelling of Some Quantum Systems" (13-02-2017), Physics department, Eva Obeed.
  - Thesis topic "Combining grid-based uncertainty propagation and neural networks with uncertainty estimation" Cybernetic department, Eirik Ekjord Vesterkjær
  - Thesis topic "Comparing Physics-Based and Data-Driven Approaches for Modelling One-Dimensional Heat Conduction" Department of mathematical sciences, Fredrik Pettersen Sandvik
  - Thesis topic "Programming at the primary level with a focus on problem solving, creativity and collaboration" Master i tilpassopplæring, Nord university, Linda Røberg
  - Thesis topic "Evaluating Machine Learning towards a cost-effective 3D CAD modelling" Cybernetic department, Mo Kari Vikøren
- School visits to observe the student teachers:
  - Rønvika og Saltvern barneskoler Bodø (Spring 2019) MAGLU2 (1-7)
  - Andenes skole ungdom skole, Andenes (Spring 2018) GLU2 (5-10)
  - Hagebyen Ungdom skole Harstad (Spring 2017) GLU2 (5-10)
  - Grønnåsen skole Bodø (Spring 2017) GLU1 (5-10)

- Organiser of a work-shop between the universities of Czech Republic and Norway "Norway-Czech WORKSHOP", Interdisciplinary Experience in Applied Physics and Applied Computer Science (July, 2015)
- Member of reviewer board, IMECS (International MultiConference of Engineers and Computer Scientists).

PROGRAMMING IN THE SCHOOL (PROGRAMMERIN I SKOLEN):

Project leader: Asif Mushtaq

Outline: To introduce the formal computing education in Norway, the ministry of Education and Research has initiated a pilot project and implemented in 2020 in schools, with computer programming as integrated aspects in many subjects and fixed the responsibility on mathematics department to develop the activities in this direction. I am one of then who took the initiative in this direction at Nord university.

Key accomplishments so far:

- Spring- 2020 (October, 2019): I organized a kick-off seminar at the Nord university, Bodø campus where more around 30 experts and participants took part nationally.
- Fall-2020(Janaury,2020): Workshop was arranged for master´s student GLU4 (Bodø-Campus) to introduce programming first time.
- Special workshop on programming for 2nd year students MAGLU program
- September-2020. Conducted two workshops on Forskningdagene-2020 for Vidregående skole students having a title "Micro:bit som hjerne for mange aktiviteter"
- March 2021: Conducted a workshop on programming at Levanger campus for 2nd year students
- September-2020. Integrated the programming in the existing course contents of mathematical course MAGLU 5001, MAGLU 5002, MAGLU 5003, MAGLU 5004 and MAGLU 2004 at Bodø campus.
- Merge this idea in the EU-project iTEM which has worth of 58000 Euros

Work in the internal system (Nord University)

- Educate the educators
- Introducing programming to our teacher students (integration in the existing)
- Will conduct workshops on programming in spring 2021 for MAGLU4 students Nesna campus
- Will conduct workshops on programming in spring 2021 for MAGLU4 students Bodø campus
- Conduct workshops and seminar
- Developing curriculum and contents of this new course
- Mutual cooperation between the campuses through programming
- Part of Universitetskoleprojekt
- Part of iTEM project (EEA-project)

Work Externally:

- Cooperating with primary and secondary schools
- Worked with Bodin VGs
- National networking
- International networking
- Write external and internal proposals on this issue

TEACHING ASSISTANT:

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Institute of Mathematical Sciences, NTNU, Trondheim Norway

o	Numerical mathematics	August 2015 – December 2015
o	Calculus I (TMA 4100)	August 2015 – December 2015
o	Numerical mathematics	August 2014 – December 2014
o	Numerical mathematics	August 2013 – December 2013
o	Mathematical approximation methods in physics	December 2009 – May 2010

Department of Theoretical Physics NTNU, Trondheim Norway
- o Organized and cleaned the lecture notes for Ph.D course
- o Wrote latex code to form a good shape compendium

COMPUTER SKILLS:

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OS: Linux, Mac, Windows
Text processing: LATEX, Microsoft Office, HTML
Programming Languages: Python, Matlab, Maple
Software: SIMRA, Paraview, COMSOL, FEniCS, Inkscape vector

LANGUAGES:

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Urdu: Mother tongue
English: Fluent (Reading, Writing, Speaking)
Norwegian: Norskprøve II (Working efficient)
Punjabi: Fluent (Reading, Writing, Speaking)

PUBLICATIONS: Journals and Proceedings:

1. M.A. Farooq, A. Salahuddin, **A. Mushtaq**, M. Razzaq, "A Simplified Finite Difference Method (SFPM) Solution via Triagonal Matrix Algorithm for MHD Radiating Nanofluid Over a Slippery Sheet Submerged in Permeable Medium", Mathematical Problems in Engineering (February 2021)

2. D. G. Kim, Z . H. Shamsi, **A.Mushtaq**, M. Hussain, M. Adnan, M. A. Farooq. "Mixed Noise Removal Using Adaptive Median Based Non-Local Rank Minimization" IEEE Access, Vol 9 (January 2021)

3. **A. Mushtaq**, A. Noreen, K. Olaussen, "Numerical solution of Quantum Mechanical Eigenvalue Problems" Frontier in Physics**;** Mathematical and Statistical Physics, Vol. 8, S. 1-10 (September 2020)

4. M. A. Frooq, A. Salahuddin, M. Razzaq, S. Hussain, **A.Mushtaq**, "Computational analysis of unsteady and steady magnetohydrodynamic radiating nano fluid flows past a slippery stretching sheet immersed in a permeable medium" Scientia Iranica, International Journal of Science and Technology, Vol. 27, (December, 2020)

5. M. Irfan, M. A. Farooq, **A. Mushtaq**, Z.Shamsi, " Unsteady MHD Bionanofluid Flow in a Porous Medium with Thermal Radiation near a Stretching/Shrinking Sheet" Mathematical Problems in Engineering, Volume 2020 (November, 2020)

6. Z. Shamsi, A. Noreen, **A. Mushtaq**, "Analysis of quantum coherence for localized fermionic systems in an accelerated motion" Results in Physics, Vol. 19 (August, 2020)

7. M. A. Farooq, R. Sharif, S. Naz, **A. Mushtaq**, "Numerical Comparison of Constant and Variable Fluid Properties for MHD Flow over a Nonlinearly Stretching Sheet" IAENG International Journal of Applied Mathematics Vol 50 (2), 384--395 (June, 2020)

8. M. Irfan, M. A. Farooq, T. Iqra, **A. Mushtaq**, Z.Shamsi , A Simplified Finite Difference Method (SFDM) for EMHDPowell–Eyring Nanofluid Flow Featuring Variable ThicknessSurface and Variable Fluid Characteristics" Mathematical Problems inengineering, Vol 2020 (December, 2020).

9. A. Mushtaq, A. Noreen, A. Farooq, "Numerical Simulations for the Toda Lattices Hamiltonian system: Higher Order Symplectic Illustrative Perspective", PLOS ONE, Vol 14 (04), 1--22 (April 2019)

10. **A. Mushtaq**, M. Asif Farooq, R. Sharif and M. Razzaq. "The impact of variable fluid properties on hydromagnetic boundary layer and heat transfer flows over an exponentially stretching sheet" Journal of Physics Communications 2019 ; Volume 3.(9) s. 095005.

11. Z. Afzal, M. Y. Bhatti, N. Amin**, A. Mushtaq**, C. Y. Jung, "Effect of Alpha-Type External Input on Annihilation of Self-Sustained Activity in a Two Population Neural Field Model" IEEE Access, Vol 7 (01), 108411--108418 (December, 2019).

12. R. Razia, A. Farooq, **A. Mushtaq**, "MHD Study of Variable Fluid Properties and Their Impact on Nanofluid over an Exponentially Stretching Sheet", Journal of Nanofluid, Vol 8, 1249—1259 (June, 2019)

13. **A. Mushtaq**, "Geometric Numerical Integration with HOMsPy", IAENG International Journal of Applied Mathematics (IJAM), Vol. 45 (4), 383-391, (14 November, 2015).

14. **A. Mushtaq**, A. Kværnø, K. Olaussen,"Scientific Computing with HOMsPy", Lecture Notes in Engineering and Computer Science, Vol I, Hong Kong (2015).
    (Got certificate of merit in best paper award category)

15. **A. Mushtaq**, T. Kvamsdal, K. Olaussen,"Python Classes for Numerical Solution of PDEs", Lecture Notes in Engineering and Computer Science, Vol II, Hong Kong (2015).

16. **A. Mushtaq**, K. Olaussen, "Automatic code generator for higher order integrators", Computer Physics Communications (CPC), Vol 185 (5), 1461-1472 (May 2014).

17. **A. Mushtaq**, A. Kværnø, K. Olaussen, "Higher-Order Geometric Integrators for a Class of Hamiltonian Systems", Int. Journal of Geometric Methods in Modern Physics, Vol 11 (1), 1450009-1-20 (2014).

18. A. Rasheed**, A. Mushtaq**, "Numerical Analysis of the Flight Condition at the Alta Airport, Norway", Aviation, Vol 18, No. 3 (September, 2014).

19. **A. Mushtaq**, A. Kværnø, K. Olaussen,"Systematic Improvement of Splitting Methods for the Hamilton Equations", Proceedings of the World Congress on Engineering, Vol 1, London (2012).

20. **A. Mushtaq**, A. Noreen, I. Øverbø, K. Olaussen, "Very-high-precision solutions of a class of Schrödinger type equations", Computer Physics Communications, Vol 182, 1810- 1813 (2011).

REPORTS/THESIS:

21. Asif Mushtaq, "Effective Project Work of the Course MA2501 Numerical Methods in Groups" (For University-level Mathematics Teaching course). Trondheim Norway: Universitetet i Agder and NTNU (February, 2017)

22. Asif Mushtaq, Trond Kvamsdal, " Statistical Analysis of Wind speed data", SINTEF A26262, SINTEF ICT, June 2014, Trondheim, ISBN: 978-82-14-05358-6

23. Asif Mushtaq, Higher Order Integrators for Hamilton´s Equations: Modified symplectic algorithms, Department of mathematical sciences, NTNU, Trondheim, ISBN 978-82-326-0541-5

24. Asif Mushtaq, Some finite difference methods for elliptic equations, Department of mathematics, Government College University (GCU) Lahore Pakistan.

POSTER PRESENTATIONS:

25. **A. Mushtaq**," Scientific Computing with HOMsPy: Higher Order (Symplectic) methods in Python", World Congress of Engineering (WCE 2015), International Association of Engineers; Hong Kong; 18—20-03-2015

26. **A. Mushtaq**, A. Rasheed. T. Kvamsdal, M. Tabib. Statistical analysis of wind mast data from the Bassaker Wind Farm. EERA DeepWind 2015, 12th Deep Sea Offshore Wind R&D Conference, Norwegian Research Center for Offshore Wind Technology, Trondheim. 2015-02-04 - 2015-02-06.

27. **A. Mushtaq**, A. Noreen, (poster presentation) "Very-high-precision solutions of a class of Schrodinger equations" Conference on Computational Physics, CCP, Trondheim Norway; 2010-06-23 - 2010-06-26.

INTEREST AND HOBBIES:

Sports: Cricket: One of the pioneer members who introduced cricket club in NTNUI and Trondheim.
- Played Norway´s League level III in Oslo and representing Trondheim and NTNUI Cricket club.
- Best player of cricket tournaments arranged by Government sports board, SAARC in Trondheim, PSAIT, Tamil Association and Specktra cricket club Trondheim

- Won competitions in rowing and table tennis
- Love to do fishing. Good player of squash
- Cooking: Got first prize in cooking competition at PSAIT food festival.

(Asif Mushtaq)