Ashim Khanal

Industrial and Management Systems Engineering, University of South Florida, Tampa, FL, 33620

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Teaching Interests

• Sustainable Supply Chain and Logistics Management

• Multi-objective Optimization

• Production and Operations Management

• Network Design and Optimization Under Uncertainty

• Environment, Society, Economics, and Governance for Sustainability

• Predictive & Prescriptive Analytics with Visualization in Python

• Real time Decision Making with Deep Reinforcement Learning and Attention Nets

Research Interests

• Novel, Efficient and Scalable Multi-objective Optimization Methods & Algorithms

• Sustainable Global Supply Chain and Circular Economy

• Agentic AI for Real Time Decision Making in Production, Warehousing and Logistics Management

• Logistics Network Optimization Under Uncertainty with Fairness and Equity Framework

• Smart Systems for Real Time & Sustainable Decision Making

• Efficient Decomposition Methods for Large Scale Multi-Objective Linear and Non-Linear Optimization

• Sustainable Decision Making under Environmental, Societal, Economic, Human Behavior and Governance Policy
Framework

Education

AUG 2020 – CURRENT (Expected December 2025)
Ph.D. Candidate (ABD) Industrial Engineering | University of South Florida | Tampa, FL

Potential Dissertation Topic: Multi-objective Optimization for Sustainable Systems: Methods, Algorithms and
Applications. Advisor: Dr Hadi Charkhgard (Gard)

Notable Coursework: Deep Reinforcement Learning, Multi-objective Optimization, Data Driven Optimization

AUG 2020 – MAY 2023
M.S. Industrial Engineering | University of South Florida | Tampa, FL

Projects Focus: Supply Chain Network Optimization and Analytics

Notable Coursework: Network Modeling Design and Optimization, Data Mining, Statistical Fundamentals of Data
Intelligence, Optimization Methods with Applications

SEP 2014 – JAN 2019
B.E. Industrial Engineering | Tribhuvan University | Kathmandu, Nepal

Seminar Project: Total Productive Maintenance (TPM) Practices and Implementation in a COKE bottling plant

Notable Coursework: Operations Research, Supply Chain Engineering and Management, Quality Management,
Project Management, Industrial Management, Micro and Macro Economics

Experience

JAN 2021 – PRESENT

GRADUATE RESEARCH ASSISTANT | Multi-Objective Optimization Lab | University of South Florida

- Authored and presented 4 scientific papers in prestigious conferences and journals (ELSEVIER, INFORMS; 3 published, 1 submitted) and in addition, co-authored 1 publication
- Innovated a novel heuristic method for solving large scale maximum multiplicative programs achieving 3 times faster computation with a maximum of 3% gap compared to state-of-the-art. Applications to Game Theory, Sustainability, Equity, Reliability
- Developed 'AquaNutriOpt', an open-source multi-objective, multi-period watershed optimization & management Python package (available on *PyPI*); *Funded by the Environmental Protection Agency*
- Developed a generalized web-based watershed management system for Harmful Algal Bloom control, integrating automated hydrological model classification via decision trees, data-driven optimization (AquaNutriOpt), and GIS visualization in a unified GUI. *Funded by U.S. Army Corps of Engineer*

JAN 2021 – PRESENT

GRADUATE TEACHING ASSISTANT| Industrial & Management Systems Engineering | University of South Florida

- Courses Assisted:
    - EIN 6935 Python for Data Science (Master's Level)
    - ESI 6410 Optimization Methods with Applications (Master's Level)
    - EGN 3615 Engineering Economic Analysis (Bachelor's Level)
- Mentored both Graduate and Undergraduate level courses for over 300 students.
- Duties involved teaching selected chapters by professors, leading recitation practice classes, helping students in office hours, and grading exams.

NOV 2019 – MAR 2019

ASSISTANT LECTURER – Part Time | Industrial Engineering | Tribhuvan University

- IE 505 Material Science & Metallurgy (Bachelor's Level)
- Delivered lectures and practical lab sessions for two engineering undergraduate classes of 48 students each, focusing on sustainable and environmentally friendly materials for engineering design for one semester

MAY 2019 – AUG 2019

SUPPLY CHAIN INTERNSHIP | Unilever Nepal Limited | Hetauda, Nepal

Project: Lean production planning and process improvement in stores operation

- Reduced production changeovers from an average of 117 to 105 per month in four plants. *Techniques used: Mixed-Integer Programming & Data Analytics, Statistical Forecasting and Inventory Optimization*

May 2018 – SEP 2018

INTERN at SUPPLY CHAIN FUNCTION | Bottlers Nepal Limited (COKE bottling) | Kathmandu, Nepal

Project: Implementation of total productive maintenance & management for KPIs improvement

- Improved closure yield from 98.7% to 99.5% enhancing production efficiency and reducing waste. *Techniques used: AutoCAD, Total Productive Maintenance and Management (TPM), and Root Cause Analysis (RCA)*

Peer Reviewed Publications

1. A Criterion Space Search Feasibility Pump Heuristic for Solving Maximum Multiplicative Programs. ***Discrete Optimization 2025*** *Link*
2. AquaNutriOpt: Optimizing nutrients for controlling harmful algal blooms in Python—A case study of Lake Okeechobee. ***Environmental Modelling and Software 2024*** *Link*
3. AquaNutriOpt II: A Multi-Period Bi-Objective Nutrient Optimization Python Tool for Controlling Harmful Algal Blooms - A Case Study of Lake Okeechobee. ***Environmental Modelling and Software 2025*** *Link*

4. Effects of the spatial distribution of best management practices for watershed-wide nutrient load reduction. *co-author: Ecological Engineering 2024*
5. Generalized Approach to Integrated Modeling of Watershed, Water Body, and Best Management Practices Optimization with Graphical User Interface. ***Submitted 2025***
6. Total Number of Main Author Peer-Reviewed Publications : 4 , additional 1 as coauthor *Google Scholar Link*

Conference Presentations

- Decision Support for Watershed Nutrient Management *Tethys Summit 2025, Tampa (**Invited Plenary Talk**) Link*
- AquaNutriOpt V2.0: A Bi-Objective Multi-Period Optimization Tool for Controlling Harmful Algal Blooms (HABs). *INFORMS Annual Meeting 2024, Seattle (Invited) Link*
- A Novel Optimization Model with Python Package for Controlling Harmful Algal Blooms in Lake Okeechobee. *INFORMS Annual Meeting 2023, Phoenix (Invited) Link*
- A Feasibility Pump based heuristic approach for maximum multiplicative integer linear programs. *INFORMS Annual Meeting 2022, Indianapolis (Invited) Link*

Upcoming Conference Presentations:
- Multi-Objective Optimization for Sustainable Watershed Management: Algorithms, Tools, and Decision Support System *INFORMS Annual Meeting 2025, Atlanta (Invited)*
- Poster Competition: An Integrated Web Tool for Nutrient Optimization and Watershed Model Selection in Harmful Algal Bloom Mitigation, *INFORMS Annual Meeting 2025, Atlanta 2025*

Notable Projects

- **Network Modeling, Design, and Optimization:** Randomized Adaptive search Metaheuristics for solving Large-Scale Travelling Salesman Problem.
  Outcome: Maximum gap of 6.04% on networks involving over 1000 cities
- **Data-Driven Optimization:** Robust Network Optimization Modeling and Validation for Harmful Algal Bloom Control in Lake Okeechobee.
  Outcome: Robust optimization model reduced risk by limiting worst-case nutrient flow increases to ~5% compared to deterministic models, which showed up to 25% performance degradation under adverse conditions
- **Deep Learning:** Does Convolutional Neural Network trained on normal images recognize horizontally and vertically flipped images?
  Outcome: CNN recognized flipped images while trained on normal images for 10% of the case. RESNET-50 architecture improved accuracy for such prediction to 65%.
- **Deep Reinforcement Learning:** Solving Bi-Objective Network Optimization Model for lake-watershed management using Dueling DQN architecture
  Outcome: Achieved 5% better nutrient load estimation at target node than classical optimization heuristics.
- **Advanced Engineering Analytics:** Multi-class Cyber Malware classification based on API calls on a server using advanced analytics models with data wrangling
  Outcome: Synthetic data generation for class balancing and principal component analysis improved the accuracy of random forest classifier and neural network classifier from 25% to 90%
- **Integer Programming:** Improving the Feasibility Pump Heuristic for Mixed Integer Programs
  Outcome: 5-fold cross validation and multi-layer perceptron regressor model predicted the number of variables to be flipped and Perturbation Frequency to avoid stalling issues

Skills

Operations Research & Optimization: • Operations Research Methods & Algorithms • Mixed-Integer Linear Programming • Multi-Objective Optimization • Multiplicative Programming • Large Scale Decomposition Methods

• Non-Linear Programming • Robust Optimization • Stochastic Optimization • Combinatorial Network Optimization • Gurobi • CPLEX • SCIP • Coin-OR CBC • Ipopt

Engineering Management: Supply Chain Management • Smart & Sustainable Systems Modeling • Descriptive, Prescriptive, and Predictive Analytics • Economics & Financial Analysis • Lean Manufacturing • Operations Management • Total Productive Management • Root Cause Analysis • Game Theory & Strategy • Total Quality Management (TQM)

Machine Learning & Analytics: TensorFlow • PyTorch • Scikit-Learn • Pandas • Matplotlib • Seaborn • Spark • Weka • Data Preprocessing and Wrangling • Reinforcement Learning • Deep Learning Models • Deep Reinforcement Learning Algorithms

Programming: Python • C++ • Julia • R • SQL • Shell Script • Data Structures & Algorithms • Excel VBA

Collaborative Development: Git • Ubuntu • Docker • VS Code • PyCharm • Latex

Soft Skills: • Leadership • Innovativeness • Time-Management • Teamwork • Problem-Solving • Effective Communication • Analytical Thinking • Self-Motivated • Solution Oriented • Conflict Management • Flexibility • Adaptability

Leadership and Services

President - INFORMS Student Chapter at University of South Florida 2023-24

- Winner *Summa Cum Laude* Best Student Chapter Award at INFORMS Annual Meeting 2024, Seattle.
- Organized 11 faculty lecture series, hosting faculty scholars from prestigious US universities
- Organized an international data science boot camp collaborating with universities in Peru, Nepal, and Chile, attracting 45 participants.
- Reference: Dr Jose Zayas-Castro (Chapter Advisor & Mentor) *Email*

President - Nepalese Student's Association at University of South Florida 2022-23

- Organized cultural events engaging 200+ students
- Launched sustainable furniture donation program for new incoming Nepalese students
- Boosted association funding by 60% through strategic event planning and outreach

Student Volunteer at 17th INFORMS COMPUTING Society CONFERENCE, Tampa, 2022

- Managed registration desks and coordinated logistics for 90+ attendees, streamlining check-in processes.
- Reference: Dr. Hadi Charkhgard (Co-chair of the conference) *Email*

Student Volunteer – INFORMS Annual Meeting 2021, Anaheim

- Assisted presenters and attendees with virtual session navigation and technical support enhancing and easing virtual (COVID 19) experience

Awards

Summa Cum Laude - *Best Student Chapter Award,* INFORMS Annual Meeting 2024, Seattle *Link*

Semester Topper (Undergraduate) - *Highest GPA in the class of 2018,* Industrial Engineering for three semesters and third rank overall

Undergraduate Merit Scholarship: *Secured full tuition scholarship*, competing with over 15000 examinees, for a 4-year undergraduate degree based upon the nationwide Institute of Engineering (IOE) entrance examination

Student of the Month (High School) - *Best performance in academics (GPA)* among high school colleagues.

Professional Affiliation

- Member, Institute for Operations Research & Management Sciences (INFORMS)
- Member, Institute of Industrial and Systems Engineers (IISE)

- Member, Tethys Geo Science Foundation

Certifications
- **Data Science and AI**, Coursera 2020
- **Microsoft Office Specialist** Certification, 2017
- **Energy Efficiency and Management**, Government of Nepal, 2017

Languages
- **Nepali** (Native), **English** (Proficient), **Hindi** (Intermediate)

References

Hadi Charkhgard (Gard) | Associate Professor, Department of Industrial & Management Systems Engineering, University of South Florida, Tampa, FL | Phone: +1 404 7365080 | hcharkhgard@usf.edu | *Major Ph.D. Advisor*

Jamie Chilton | Associate Professor of Instruction| Department of Industrial & Management Systems Engineering, University of South Florida, Tampa, FL | Phone: +1 8139747918| jmchilton@usf.edu *Teaching Assistant Supervisor*

Ankit Shah | Assistant Professor | Department of Operations & Decision Technologies, Kelly School of Business, Indiana University - Bloomington, IN | Phone: 812-855-6331 | ankit@iu.edu | *Business School Professional, Mentor Reference*

Mauricio E. Arias | Associate Professor, Department of Civil & Environmental Engineering, University of South Florida, Tampa, FL | Phone: (813) 974-5593 | mearias@usf.edu *Dissertation Committee Member*

Jose Zayas-Castro | Professor, Department of Industrial and Management Systems Engineering, University of South Florida, Tampa, FL | Phone: +1 813-789-1125 | josezaya@usf.edu | *Leadership Mentor, INFORMS Student Chapter Advisor*