# Johannes Lutzeyer

johannes[dot]lutzeyer[at]polytechnique.edu

## EDUCATION

### Imperial College London

**Oct. 2015 – Feb. 2020** PhD in Statistics (funded by: EPSRC) — supervised by Prof. Andrew T. Walden
"Network Representation Matrices and their Eigenproperties: A Comparative Study"

- Topic includes: community detection, graphical and latent space modelling, and spectral analysis.
- Lecture subjects include: Deep Learning; Wavelets and Applications; Topics in Large Dimensional Data Processing; Graph Theory; Random Matrix Theory; Statistical Methods for Big Data.
- Undertaking research work to solve advanced statistical and mathematical problems, contributing to and understanding the current statistical research literature and communicating technical solutions clearly in written and oral form.

**Oct. 2014 – Sept. 2015** MSc Statistics (Distinction, funded by: "Studienstiftung des deutschen Volkes")

- Thesis title: "Automated Control Point Image Registration" – supervised by Dr. Edward A. K.Cohen.
- Main Subjects: Non-Parametric Smoothing and Wavelets; Time Series; Computational Statistics; Applied Statistics; Bayesian Data Analysis; Statistics for Extreme Events; Graphical Models.
- Built up a very well founded applied and theoretical knowledge of Statistics. It ensures complete understanding of the basis and comprehension of the advanced issues in Statistics.

**Oct. 2011 – June 2014** BSc Mathematics (First Class Honours)

- Main Subjects: Scientific Computation (Introduction to C); Statistical Pattern Recognition; Group Theory; Applied Probability; Statistical Modelling; Stochastic Simulation; Games Risks and Decisions.
- These subjects provide me with a good basis to analyse data and understand statistical models. This degree equips me with the skill to systematically break up and solve problems.

### European Baccalaureate (Final Grade: 92%)

**Sept. 2001 – July 2011** European School Brussels Woluwe

- Subjects included: Mathematics, Physics, Chemistry, Biology, Philosophy and ICT.

## WORK EXPERIENCE

### Assistant Professor in the Data Science and Mining (DaSciM) Team

**Sept. 2022 – Present** Laboratoire d'Informatique (LIX), École Polytechnique, Institut Polytechnique de Paris

- Conducting research in the areas of Graph Representation Learning and Graph Neural Networks.
- Co-responsible for the MScT in "AI and Advanced Visual Computing" at École Polytechnique.
- Co-coordinating the "Projects Scientifique Collectif (PSC)" in the second year of the Cycle Ingénieur polytechnicien program in Computer Science.
- Co-supervising four PhD students, three M1 interns and two X3 student projects.

### Postdoctoral Researcher in the Data Science and Mining (DaSciM) Team

**March 2020 – Aug. 2022** Laboratoire d'Informatique (LIX), École Polytechnique, Institut Polytechnique de Paris

- Conducting research in the areas of Graph Representation Learning and Graph Neural Networks.
- Awarded Seal of Excellence from the European Commission for a MSCA proposal submitted to H2020 and assisting in the submission of 1 ANR and 3 CAP Digital funding proposals.
- Responsible for the project management of DaSciM's research collaboration with SEPHORA & LVMH.
- Closely collaborating with and participating in the supervision of two M1 and five PhD students.
- Contributing to the groups' teaching effort in four different courses.

Oct. 2014 – Sept. 2019 **Graduate Teaching Assistant (GTA) and Tutor**
Imperial College London
- Awarded Associate Fellowship of the Higher Education Academy (AFHEA) for my conscious approach and significant contribution to the Department's teaching.
- GTA tasks include: preparing and delivering lectures on test solutions, demonstrating in problem classes, providing feedback to lecturers to improve the courses and marking of coursework and exams.
- Privately tutored an MSc Statistics student in "Fundamentals of Statistical Inference."

June 2015 – Sept. 2019 **Subwarden**
Gabor Hall, Imperial College London
- Responsible for supporting students suffering from mental instability/health issues, scheduling and leading of discipline meetings and running of large-scale events with 50-400 attendees.
- Holding an emergency phone acting as a point of first contact.
- Reviewing subwarden and senior applications and being part of the interview panel on 12 occasions.
- Requires a high amount of teamwork in the warden team and effective leadership to coordinate the team of 8 UG seniors in order to run social hall events.
- Training courses: Mental Health First Aid, Emergency First Aid at Work, Fire Prevention, Subwarden training day (learning how to lead discussions in a range of scenarios aided by professional actors).

July – Aug. 2014 **Business Intelligence Intern**
Rocket Internet, Berlin
- Worked in a team to build and maintain the business reporting system of several start-ups. This included extracting data from several sources, loading it to a data warehouse and then processing it.
- Independently designed and coded a quality assurance tool guaranteeing integrity of database loads.
- Further developed ability to work under pressure and facilitated frictionless communication in a team.

July 2012 – June 2015 **Hall Senior**
Falmouth & Keogh Hall, Imperial College London
- Worked in a team of 10 students and one lecturer to help 150 new students in our hall to settle in London and organised and ran large scale events such as: trips to European capitals and parties.
- Requires a great deal of teamwork, crowd management and ability to organise large events.

## ACHIEVEMENTS & SERVICE

**Invited Talks**
- "Understanding Virtual Nodes in Graph Neural Networks: Oversmoothing, Oversquashing and Node Heterogeneity," (*Keynote talk*), GdR Day on Learning and Graphs, March 2025. Link to Event Page.
- "An Analysis of Virtual Nodes in Graph Neural Networks," GeomeriX Group Seminar, March 2025. Link to Event Page.
- "Methodological Advances in Graph Neural Networks," Ericsson Research, December 2024.
- "Graph Learning for and with Graph Neural Networks," (*Keynote talk*), GdR Graph Learning Day, June 2024. Link to Event Page.
- "Recent Advances in Graph Neural Network Robustness," AIDRC Seminar Series, May 2024. Link to Event Page.
- "Path Neural Networks: Expressive and Accurate Graph Neural Networks," (*Plenary talk*), 2nd ELLIS UnConference, July 2023. Link to Event Page.
- "Recent Advances in Graph Neural Networks," Graphs Guild of Lloyds Banking Group, July 2023.
- "Message Passing In Graph Neural Networks," Learning on Graphs Meetup Paris, June 2023. Link to Event Page.
- "Recent Trends in Graph Representation Learning," Seminar Series of the Laboratoire Modélisation, Information & Systèmes in Amiens, June 2023.
- "Advances in Graph Representation Learning: The Graph Ordering Attention Networks," Seminaire Palaisien, February 2023. Link to Event Page.
- "Different Approaches To Message Passing In Graph Neural Networks," Amazon Graph Machine Learning Reading Group, January 2023.
- "Graph Representation Learning via Graph Neural Networks," LIX Seminar Series, October 2022. Link to Event Page & Recording.
- "Graph Ordering Attention Networks," Learning on Graphs and Geometry Reading Group, June 2022. Link to Event Page & YouTube Recording.
- "Graph Shift Operators and Their Relevance to Graph Neural Networks," (*Keynote talk*), Recent Advances in Graph Machine Learning Workshop, March 2022. Link to Event Page.

**Invited Talks (Continued)**

- "Learning Parametrised Graph Shift Operators," Learning on Graphs and Geometry Reading Group, January 2022. Link to Event Page & YouTube Recording.
- "Extending the Davis-Kahan theorem for the comparison of embedding spaces spanned by eigenvectors," LIX Data Science & Machine Learning Seminar, February 2020. Link to Event Page.

**Funding**

- "GraspGNNs: Graph Shift Operators for, in and from Graph Neural Networks," *ANR JCJC (Coordinator)*, 335 279€, 2025.
- "DGSP: Dynamical Graph Signal Processing," *ANR PRC (Scientific Team Member)*, 355 071€, 2025.
- "Artificial Intelligence Methodology and Resources to Accelerate Drug Discovery," (Continuation Project) *Carnot Label Grant*, 18 months, 60 000€, 2024.
- "HistoGraph: Multi-Site Multi-Modal Histopathological Diagnostic Support using Graph Representations," *ANR PRC (Scientific Manager)*, 167 980€, 2024.
- "Artificial Intelligence Methodology and Resources to Accelerate Drug Discovery," *Carnot Label Grant*, 18 months, 60 000€, 2022.
- "Thirty-seventh Conference on Neural Information Processing Systems," *Biomedical Engineering (BME) Conference Fellowship, E4H, EUR – Bertip (ANR 18EURE0002)*, 3 700€, 2022.

**Prizes**

- Top Reviewer Award, Learning on Graphs Conference (LOG), 2024.
- Best Reviewer Award, International Conference on Machine Learning (ICML), 2024.
- Top Reviewer Award, Conference on Neural Information Processing Systems (NeurIPS), 2023.
- Member of the winning team: "Medical data dive" – 5 day hackathon, Imperial College London, 2019.
- Winton Capital Prize for overall best student in my MSc cohort, 2015.
- Warner Prize for best MSc project in my MSc cohort, 2015.

**Event Organisation**

- Co-organiser of the Paris Learning on Graphs Meetup accompanying the Learning on Graphs Conference (LOG), 2023 & 2024. Link to Event Page.
- Organiser of weekly DaSciM seminar series (speaker recruitment, advertisements, chairing sessions).

**Thesis Committees**

- Member of the Comité de Suivi of Hugo Attali, *Paris Sorbonne Nord, LIPN*, September 2024.
- Member of the Comité de Suivi of Andjela Todorovic, *LTCI, Telecom Paris, IPP*, June 2024.
- Reviewer at the PhD Defense of Admir Selimovic, *ETH Zurich*, May 2024.
- Member of the Comité de Suivi of Nouamane Arhachoui, *Sorbonne Université, LIP6*, October 2023 & 2024.

**Memberships**

- Professional member of the Association for Computing Machinery (ACM), Jan. 2023 - Dec. 2023.
- Alumni of German National Academic Foundation ("Studienstiftung des deutschen Volkes"), which has a very competitive selection process. Active membership Jan. 2012 - Sept. 2015.
- Member of the alumni organization "Club der Ehemaligen der Deutschen Schüler Akademien" after being selected to participate in a 2-week course on Complex Chemistry in 2010.

**Summer Academies**

- "Scientific Computing in the age of Exascale" – 2-week-long academy to which I contributed a presentation entitled: "Fault tolerant GMRES and Inner-Outer solvers," Krakow, 2014.
- "Randomised Algorithms and Randomness" – 2-week-long academy to which I contributed a presentation entitled: "Multiplicative hashing and the closest pair problem in linear time," Görlitz, 2013.

## PUBLICATIONS

**Peer-reviewed Publications**

- J. Southern, F. Di Giovanni, M. Bronstein & J. F. Lutzeyer, "Understanding Virtual Nodes: Oversmoothing, Oversquashing, and Node Heterogeneity," *International Conference on Learning Representations(ICLR),* 2025.
- S. Ennadir, J. F. Lutzeyer, M. Vazirgiannis & E. H. Bergou, "If You Want to Be Robust, Be Wary of Initialization," *Conference on Neural Information Processing Systems (NeurIPS),* 2024.
- Y. Abbahaddou, S. Ennadir, J. F. Lutzeyer, M. Vazirgiannis & H. Boström, "Bounding the Expected Robustness of Graph Neural Networks Subject to Node Feature Attacks," *International Conference on Learning Representations(ICLR),* 2024.
- S. Ennadir, Y. Abbahaddou, J. F. Lutzeyer, M. Vazirgiannis & H. Boström, "A Simple and Yet Fairly Effective Defense for Graph Neural Networks," *Thirty-Seventh AAAI Conference on Artificial Intelligence (AAAI),* 2024.

Peer-reviewed Publications (Continued)

- Y. Abbahaddou, J. F. Lutzeyer & M. Vazirgiannis, "Graph Neural Networks on Discriminative Graphs of Words," *NeurIPS New Frontiers in Graph Learning Workshop,* 2023.
- G. Michel, G. Nikolentzos, J. F. Lutzeyer & M. Vazirgiannis, "Path Neural Networks: Expressive and Accurate Graph Neural Networks," *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.
- B. Doerr, A. Dremaux, J. F. Lutzeyer & A. Stumpf, "How the move acceptance hyper-heuristic copes with local optima: drastic differences between jumps and cliffs," *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO)*, 2023.
- M. Chatzianastasis, J. F. Lutzeyer, G. Dasoulas & M. Vazirgiannis, "Graph Ordering Attention Networks," *AAAI Conference on Artificial Intelligence (AAAI)*, 2023.
- G. Salha-Galvan, J. F. Lutzeyer, G. Dasoulas, R. Hennequin & M. Vazirgiannis, "New Frontiers in Graph Autoencoders: Joint Community Detection and Link Prediction," *NeurIPS New Frontiers in Graph Learning Workshop*, 2022.
- A. R. Ramos Vela, J. F. Lutzeyer, A. Giovanidis & M. Vazirgiannis, "Improving Graph Neural Networks at Scale: Combining Approximate PageRank and CoreRank," *NeurIPS New Frontiers in Graph Learning Workshop*, 2022.
- A. Qabel, S. Ennadir, G. Nikolentzos, J. F. Lutzeyer, M. Chatzianastasis, H. Bostrom & M. Vazirgiannis, "Structure-Aware Antibiotic Resistance Classification Using Graph Neural Networks," *NeurIPS AI for Science Workshop*, 2022.
- G. Salha-Galvan, J. F. Lutzeyer, G. Dasoulas, R. Hennequin & M. Vazirgiannis, "Modularity-Aware Graph Autoencoders for Joint Community Detection and Link Prediction," *Neural Networks*, vol. 153, pp. 474–495, 2022.
- J. F. Lutzeyer*, C. Wu* & M. Vazirgiannis, "Sparsifying the Update Step in Graph Neural Networks," *ICLR Workshop on Geometrical and Topological Representation Learning*, 2022. *equal contribution
- M. E. A. Seddik, C. Wu, J. F. Lutzeyer & M. Vazirgiannis, "Node Feature Kernels Increase Graph Convolutional Network Robustness," *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2022.
- G. Dasoulas*, J. F. Lutzeyer* & M. Vazirgiannis, "Learning Parametrised Graph Shift Operators," *International Conference of Learning Representations (ICLR)*, 2021. *equal contribution
- J. F. Lutzeyer & A. T. Walden, "Comparing Spectra of Graph Shift Operator Matrices," *International Conference on Complex Networks and their Applications*, 2020.

Published Preprints

- J. F. Lutzeyer & A. T. Walden, "Extending the Davis-Kahan theorem for comparing eigenvectors of two symmetric matrices I: Theory," *arXiv:1908.03462*, 2019.
- J. F. Lutzeyer & A. T. Walden, "Extending the Davis-Kahan theorem for comparing eigenvectors of two symmetric matrices II: Computation and Applications," *arXiv:1908.03465*, 2019.
- J. F. Lutzeyer & E. A. K. Cohen, "Correcting the estimator for the mean vectors in a multivariate errors-in-variables regression model," *arXiv:1510.03600*, 2015.

## TEACHING EXPERIENCE

2025 "*Advanced Deep Learning*" (132 B3/M1 students, École Polytechnique)
12 hours – teaching lectures (6 hours) and labs (6 hours, Python);
marking oral (22) and written assessments (44).
"*Deep Learning*" (26 B3/M1 students, SPEIT Shanghai Jiao Tong University)
24 hours – teaching lectures (12 hours) and labs (12 hours, Python);
marking oral assessments (10).
"*CSE204: Machine Learning*" (99 B2, École Polytechnique)
4 hours – teaching labs (Python).
"*INF592: Internship in Data Science*" (3 B3/M1 students, École Polytechnique)
3 hours – member of 3 defense juries.

2024 "*Advanced Deep Learning*" (53 B3/M1 students, École Polytechnique)
12 hours – teaching lectures (6 hours) and labs (6 hours, Python);
marking oral (10) and written assessments (13).
"*Deep Learning*" (26 B3/M1 students, SPEIT Shanghai Jiao Tong University)
24 hours – teaching lectures (12 hours) and labs (12 hours, Python);
marking oral assessments (10).
"*Advanced Learning for Text and Graph Data*" (128 M2 students, MVA Master)
8 hours – teaching labs (Python); marking oral (18) and written assessments (64).
"*INF554: Machine and Deep Learning*" (150 B3/M1 students, École Polytechnique)
36 hours – teaching labs (Python).
"*CSE204: Machine Learning*" (80 B2, École Polytechnique)
22 hours – teaching labs (Python); marking oral assessments (6).
"*INF592: Internship in Data Science*" (2 B3/M1 students, École Polytechnique)
2 hours – member of 2 defense juries.

2023 "*Advanced Learning for Text and Graph Data*" (132 M2 students, MVA Master)
8 hours – teaching labs (Python); marking oral (16) and written assessments (67).
"*INF554: Machine and Deep Learning*" (150 B3/M1 students, École Polytechnique)
36 hours – teaching labs (Python).
"*INF537: Image Analysis and Computer Vision*" (60 B3/M1 students, École Polytechnique)
23 hours – teaching lectures (2 hours) and labs (21 hours, Python);
marking oral (27) and written assessments (120).
"*CSE204: Machine Learning*" (80 B2, École Polytechnique)
22 hours – teaching labs (Python); marking oral (9) and written assessments (200).
"*Data Science Starter Program*" (20 professionals, École Polytechnique Executive Education)
3.5 hours – teaching lectures.
"*INF592: Internship in Data Science*" (10 B3/M1 students, École Polytechnique)
12 hours – member of 12 defense juries.
"*Research Internship*" (1 M1 student, École Polytechnique)
12 weeks – drafted project abstract; supervised student in weekly meetings.

2022 "*Advanced Learning for Text and Graph Data*" (80 M2 students, MVA Master)
6 hours – teaching labs (Python); marking oral (11) and written assessments (40).
"*INF554: Machine and Deep Learning*" (150 B3/M1 students, École Polytechnique)
36 hours – teaching labs (Python); marking oral (15) and written assessments (22).
"*INF537: Image Analysis and Computer Vision*" (60 B3/M1 students, École Polytechnique)
23 hours – teaching lectures (2 hours) and labs (21 hours, Python);
marking oral (27) and written assessments (120).
"*Data Mining*" (15 M1 students, SPEIT - ParisTech Shanghai Jiao Tong Partnership)
3 hours – teaching labs (Python).
"*Data Science Starter Program*" (20 professionals, École Polytechnique Executive Education)
17.5 hours – teaching lectures (14 hours) and labs (3.5 hours, Python).
"*Research Internship*" (1 M1 student, École Polytechnique)
15 weeks – co-drafted project abstract; co-supervised student in weekly meetings.

2021 "*Advanced Learning for Text and Graph Data*" (60 M2 students, MVA Master)
8 hours – teaching labs (Python); marking oral (11) and written assessments (33).
"*INF554: Machine and Deep Learning*" (150 B3/M1 students, École Polytechnique)
18 hours – teaching labs (Python); marking oral (14) and written assessments (23).
"*Data Mining*" (11 M1 students, SPEIT - ParisTech Shanghai Jiao Tong Partnership)
7.5 hours – teaching labs (Python); marking written assessments (11).
"*Data Science Starter Program*" (20 professionals, École Polytechnique Executive Education)
35 hours – teaching lectures (14 hours) and labs (21 hours, Python).

2020 "*Advanced Learning for Text and Graph Data*" (60 M2 students, MVA Master)
4 hours – teaching labs (Python); marking oral (6) and written assessments (16).
"*INF554: Machine and Deep Learning*" (150 B3/M1 students, École Polytechnique)
18 hours – teaching labs (Python); marking oral (14) and written assessments (16).
"*Data Science Starter Program*" (20 professionals, École Polytechnique Executive Education)
14 hours – teaching labs (Python).

2017 "*M2S1: Probability and Statistics II*" (200 B2 students, Imperial College London)
11 hours – lecturing test solutions (1 hour); teaching labs(10 hours);
marking written assessments (135).
"*M34S2: Statistical Modelling II*" (100 B3/M1 students, Imperial College London)
10 hours – teaching labs (R); marking written assessments (30).
"*M1S: Probability and Statistics I*" (250 B1 students, Imperial College London)
second marking 2 hour exams for all 250 students.

2016 "*M1S: Probability and Statistics I*" (250 B1 students, Imperial College London)
10 hours – teaching labs; marking written assessments (135);
invigilating January exam.
"*M2S2: Statistical Modelling I*" (150 B2 students, Imperial College London)
second marking 2 hour exams for all 150 students.

2015 "*M1S: Probability and Statistics I*" (250 B1 students, Imperial College London)
10 hours – teaching labs; marking written assessments (135).
"*M345S8: Time Series*" (112 B3/M1 students, Imperial College London)
marking written assessments (112).
"*Drop-In Problem Class*" (250 B1/B2 students, Imperial College London)
10 hours – teaching labs.
"*Student Tutorial*" (5 B1 students, Imperial College London)
10 hours – teaching tutorials with freedom to design content.

## REVIEWING ACTIVITY

2025 Area Chair at *International Conference on Machine Learning (ICML)* (12 papers)

2024 - Present Area Chair at *Conference on Neural Information Processing Systems (NeurIPS)* (13 papers)
2024 *International Conference on Machine Learning (ICML)* (6 reviews) [Award]
2024 *Expert Systems With Applications*, Elsevier (1 review)

2023 - Present *Transactions on Machine Learning Research (TMLR)* (2 reviews)
2023 - Present *International Conference on Learning Representations (ICLR)* (5 reviews)
2023 *Conference on Neural Information Processing Systems (NeurIPS)* (6 reviews) [Award]

2022 *Book Proposal on a Topic Related to Graphs*, Cambridge University Press (1 review)
2022 - Present *Transactions on Intelligent Systems and Technology*, ACM (3 reviews)
2022 - Present *Learning on Graphs Conference* (6 reviews) [Award in 2024]

2021 - Present *Transactions on Knowledge and Data Engineering*, IEEE (14 reviews)
2021 - Present *Applied Intelligence*, Springer (18 reviews)
2021 - Present *Neurocomputing*, Elsevier (4 reviews)

2021 *Mathematics*, MDPI (3 reviews)
2021 *Symmetry*, MDPI (2 reviews)
2021 *Semantic Web Journal*, IOS Press (2 reviews)
2019 *Nonlinear Theory and Its Applications*, IEICE (2 reviews)

## PERSONAL SKILLS

Languages German (mother tongue), English (Fluent), French (Intermediate)

Computer Proficient use of Python (Tensorflow, PyTorch), R, MATLAB, SQL, C and Maple.

| | |
|---|---|
| Communication | ▪ Interpersonal skills (gained as a Subwarden responsible for UG student welfare, when working with business partners of Rocket Internet and as Representative on open day events at Imperial College).<br>▪ International and multilingual communication (highly international environment at the European School of Brussels, at Imperial College London and at École Polytechnique).<br>▪ Public speaking, e.g., lecturing test solutions to 200 UG students at Imperial College London & labs to 150 UG students at École Polytechnique. |
| Organisational / Managerial | ▪ Experienced organiser and self-confident (after planning and running numerous big scale events).<br>▪ Leadership (leading the hall senior team and as Imperial Ambassador at a Robotics Summer School). |