

Curriculum Vitae

Christopher Marais

PhD Student in Computational Biology, University of Florida

Gainesville, Florida, USA

Email: gmarais@ufl.edu

LinkedIn: www.linkedin.com/in/christopher-marais

ORCID: 0000-0003-3409-0473

GitHub: www.github.com/ChristopherMarais

EDUCATION:

Doctor of Philosophy (PhD), (Computational Biology)

University of Florida (August 2023 – Present)

- **Major:** Forest Resources & Conservation (AI-based applications of computer vision in pest detection for forest health and pest management)
- **Certificates:**
 - Biological Systems Modelling (*August 2023 – Present*)
 - Machine Learning (*August 2023 – Present*)
- **Relevant Doctoral Coursework:**
 - Neural Net Deep Learning (EEL 6814) – advanced study of deep learning and neural network methods
 - Reproducible Quantitative Methods (FOR 6934) – emphasizes reproducible workflows and advanced data analysis
 - Biological Systems Modeling (ABE 5643C) – computational modeling of biological processes and systems
 - Advanced Research (FOR 7979) – applying machine learning, image analysis, and computational methods to entomological data

Master of Science (MS), (Computational Biology)

University of Florida (January 2022 – August 2023)

- **Major:** Forest Resources & Conservation
- **Thesis:** Digital monitoring and automated identification of bark and ambrosia beetles using deep learning
- Graduated with Highest Honors (GPA 3.95); Awarded August 15, 2023
- **Relevant Master's Coursework:**
 - Fundamentals of Machine Learning (EEL 5840)
 - Statistical Machine Learning (STA 6703)
 - Image Processing for Remote Sensing (SUR 5386) – remote sensing, hyperspectral imaging methods

- Topics in Machine Learning (ABE 6933) – in-depth coverage of unsupervised learning and advanced ML techniques
- Bayesian Statistics (FNR 6560) – Bayesian data analysis for ecological and agricultural datasets

Master of Information Technology (MIT), Big Data Science

University of Pretoria (2019 – 2020)

- **Thesis:** Interspecies gene network transfer through knowledge graph alignment (incorporating bioinformatics, data analytics, and scientific programming)

Bachelor of Science Honours (BScHons), Bioinformatics

University of Pretoria (2018)

- **Thesis:** Genome-wide SNP Genotyping for Tropical Pine Tree Species

Bachelor of Science (BSc), Human Biology

University of Pretoria (2014 – 2017)

- **Majors:** Human Genetics, Psychology, and Human Physiology

EXPERIENCE:

DevOps Engineer / Data Scientist

University of Florida (Jan 2024 – Present)

- Developing robust data pipelines and CI/CD workflows for Guana River Estuary monitoring
- Integrating GIS, sensor data, and hydrological modeling data to support decision-making and information sharing tools for water and soil conservation efforts

Graduate Research Assistant

University of Florida (Jan 2022 – Present)

- Leading deep learning efforts for automated insect identification in the Forest Entomology Lab
- Collaborating with internal UF teams and external partners (including U.S. governmental agencies such as the USDA) to strengthen pest management
- Research focuses on applying AI and machine learning to large-scale ecological datasets for both academic and applied outreach

Collaborating Data Scientist

University of Florida (May 2023 – Present)

- Machine Learning Operations (MLOps) consultant for the Padilla-Coreano Behavioral Neuroscience Lab
- Developing reproducible computational and statistical methods for high-throughput behavioral data

Teaching Assistant & Invited Lecturer

University of Florida (2024)

- **Courses:** Forests for the Future (FOR 2662), Future of Forest Health Seminar (FOR 6934)
- Delivered a guest lecture on the ethical use of AI in forestry and agricultural research

Software Engineer & Data Scientist

Panthera (April 2021 – Dec 2021)

- Built and deployed deep learning models for big cat image recognition
- Integrated remote sensing data to map animal movement corridors, enhancing conservation extension programs
- Built software tools for in-the-field offline data analysis on multiple devices

Associate: Machine Learning and AI

South African SDG Hub (Jan 2019 – July 2024)

- Built a repository of all research articles produced by universities in South Africa
- Developed fine-tuned language models on Sustainable Development Goals (SDGs) focused research
- Created COVID-19 vulnerability mapping via GIS analytics to inform the Office of the President in South Africa
- Coordinated efforts at the intersection of government needs and data-intensive research, offering insights that guided policy creation

Technical & Research Assistant

Forest Molecular Genetics (FMG), University of Pretoria (Jan 2019 – Dec 2020)

- Provided HPC and statistical software support for large-scale genomics research
- Contributed to bioinformatics pipelines for gene expression profiling and comparative genomics

KEY SKILLS

- **Machine Learning & Deep Learning:** Neural networks, unsupervised learning, computer vision, MLOps
- **Data Analysis & Modeling:** Bayesian statistics, advanced computational and statistical methods, HPC workflows, scientific programming
- **Remote Sensing & GIS:** Hyperspectral imaging, image processing for soil mapping and pest detection, geospatial data analysis

- **Bioinformatics & Genomics:** SNP genotyping, knowledge graph alignment, comparative genomics, HPC management
- **Programming & Development:** Python, R, Docker, Bash/Linux, JavaScript, SQL, Neo4j/Cypher, Flutter
- **High Performance Computing (HPC) & DevOps:** Parallel processing, data pipeline design, HPC cluster management
- **Extension & Outreach:** Translating computational research into practical guidelines
- **Languages:** Afrikaans (Fluent), English (Fluent), German (B2), Dutch (Beginner)

DISSEMINATION OF RESEARCH:

Peer-Reviewed Publications

- Jackson, C., Christie, N., Reynolds, S. M., Marais, G. C., Tii-kuzu, Y., Caballero, M., Kampman, T., Visser, E. A., Naidoo, S., Kain, D., & others. (2022). A genome-wide SNP genotyping resource for tropical pine tree species. *Molecular Ecology Resources*, 22(2), 695–710. Wiley Online Library.
- Fourie, W., van der Walt, I., Strydom, H., & Marais, C. (2019). South African system tracks SDG research. *Nature*, 573(7773), 196–197. Nature Publishing Group.
- Dong, Y., Marais, C., Wang, B., Lin, W., Chen, Y., Li, Y., Johnson, A. J., & Hulcr, J. (2024). Pre-invasion assessment of potential invasive wood borers on North American tree species in Chinese sentinel gardens. *Entomologia Generalis*, 44(4).

Other Publications

- Jiri Hulcr, Ph.D., Andrew J. Johnson, Ph.D., and G. Christopher Marais (2023, September 14). How Systematic Entomology Will Thrive in the Age of Artificial Intelligence. *Entomology Today* (<https://entomologytoday.org/2023/09/14/systematic-entomology-artificial-intelligence/>)

Conference Presentations

- Marais, C. (2024, November 12). The Evolution of Classification: AI in the Study of Bark Beetles. Presented at the Entomological Society of America (ESA) 2024, Empowering Insect Science, Management and Conservation Through Emerging Technologies Symposium.
- (2020) Development of a High-Throughput Genome-Wide Genotyping Array for Tropical and Subtropical Pine Species. Plant and Animal Genome XXVIII Conference, San Diego, CA (January 11–15, 2020).

Posters

- Marais, C. (2023, March 2). Sentinel Garden Data Management. Poster presented at the Forest Resources and Conservation Graduate Student Symposium, University of Florida.
- Marais, C. (2023, February 15). Sentinel Garden Data Management. Poster presented at the Emerging Pathogen Institute Research Day, University of Florida.
- Marais, C. (2020) Poster for BScHons research on SNP mining in pine trees, Department of Bioinformatics Student Research Day, University of Pretoria.

Media Appearances

- Marais, C. (Interviewee). (2024). How AI is Changing Insect Identification – Chris Marais. [Interview with Demain Gomez]. YouTube. (<https://www.youtube.com/watch?v=azb0KxQIQwo>)

- Schwartz, B., Marais, C., I, Stratton., (2024) How we Trained an AI to Identify Bark Beetles YouTube. (<https://www.youtube.com/watch?v=3pyKpUVxgk8&t=312s>)

AWARDS

- Forest Resource Conservation Outstanding Thesis Award (University of Florida)
- Outstanding International Master's Student (University of Florida)
- Postgraduate Masters Coursework Bursary (University of Pretoria)
- Best BScHons Bioinformatics Research Poster (University of Pretoria)

REFERENCES

- Prof. Jiri Hulcr – Associate Professor, Forest Entomology, University of Florida
Email: hulcr@ufl.edu
- Prof. Nancy Padilla-Coreano – Principal Investigator, Padilla-Coreano Lab, University of Florida
Email: npadillacoreano@ufl.edu
- Dr. Geraldine Klarenberg - Lecturer, Quantitative Data Science
Email: gklarenberg@ufl.edu
- Prof. Willem Fourie – Associate Professor, Policy Innovation Lab, Stellenbosch University
Email: willemfourie@gmail.com
- Dr. Ross Pitman – Director, TyzackLabs
Email: rpitman@tyzacklabs.org
- Prof. Zander Myburg – Director, Forest Molecular Genetics, University of Pretoria
Email: zander.myburg@fabi.up.ac.za
- Prof. Fourie Joubert – Associate Professor, Bioinformatics and Genomics, University of Pretoria
Email: fourie.joubert@up.ac.za
- Dr. Vukosi Marivate – Associate Professor, Data Science for Social Impact, University of Pretoria
Email: vukosi.marivate@cs.up.ac.za