Jacob Kapita

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EDUCATION

Ph.D. in Mathematics; minor in Computer Studies — Due Spring 2028, GPA: 3.817

Louisiana State University, Department of Mathematics
Research Interests: Computational Stochastic Analysis, Machine Learning, Data Science.

M.S. in Mathematics — May 16, 2025, GPA: 3.61

Louisiana State University, Pinkie Goldon Lane Graduate School

M.A. in Mathematics — Fall 2022, GPA: 3.30

Saint Louis University, Mathematics Department
Thesis: Application of Time Series Chain Graph Model (TSCGM) for Time Varying Genetic Network Inference.

B.Th. in Theology — May 2020, 2^{nd}-Class: Upper Division

Hekima University College, Nairobi, Kenya, School of Theology.

B.Sc. in Mathematics Education — July 2017, Distinction

The Copperbelt University, Kitwe, Zambia, Department of Mathematics Education
Research Project: The Effect of Using Real-life Line Graphs in the Understanding of Polynomial Graphs.

B.A. (Hns.) in Philosophy — May 2011, upper second division

Arrupe Jesuit University (formerly: Arrupe College), Harare, Zimbabwe, School of Philosophy and Humanities
Position paper: More Mathematics: More Socio-Economic Development for Africa.

PROFESSIONAL EXPERIENCE:

Graduate Teaching Assistant — 2023 - Present

Louisiana State University, Department of Mathematics, Baton Rouge, LA., USA.
Grading, Tutoring, Proctoring, Instructor of records for College Algebra and Differential Calculus. Supervising Machine Learning projects of three groups of students.

Research Mentor — Jul. 2025 – Present

Virtual Math Research Circle, LSU Gordon A. Cain Center for STEM Literacy, Baton Rouge, LA., USA.
Mentored three groups of high school students (14 total) on research projects involving Markov Chains and Machine Learning, including: (1) predicting Blackjack game states, (2) forecasting S&P 500 market trends, and (3) modeling U.S. inflation regimes. Guided students through research design, mathematical modeling, and computational implementation. Prepared students to present their findings to peers, parents, and professionals at the end of the program. Continued mentoring the top seven students to deepen their theoretical and applied understanding of Markov Chains, with emphasis on Hidden Markov Models (HMM) and Continuous-Time Markov Chains (CTMC). Students will present their final results at LSU Discover Day 2026.

Adjunct Lecturer Jan. 2022 – Dec. 2022
Saint Louis University, Department of Mathematics and Statistics, Saint Louis, MO., USA.
Prepared syllabus and course content for College Algebra, teaching College Algebra to a class of 30-35 learners doing various majors, preparing homework and exams, preparing online homework for various, Grading.

Teaching Assistant Aug. 2021 – Dec. 2021
Saint Louis University, Department of Mathematics and Statistics, Saint Louis, MO., USA.
Grading and Led Calculus I discussion sessions to 3 small groups of 15 each

Teacher Sept. 2011 – Jan. 2013
Jesuit Refugee Service, Dzaleka Community Day Secondary School, MALAWI.
Teaching Mathematics, Physical Science and Agriculture, Assisting the patron of Science and Mathematics Club to plan and prepare students for science fair projects,Conducting Counseling services to students, Assisting with procurement of the school needs as a driver

Mathematics Teacher Jan. 2005 – May 2005
No. 1 Zalewa Private Secondary School, Neno, MALAWI.
Teaching Mathematics to high school students

Mathematics Teacher Jan. 2004 – Dec. 2004
Wisdom Private Secondary School, Zomba, MALAWI.
Teaching Mathematics to high school students

SEMINARS/WORKSHOPS/CERTIFICATE COURSES

SIAM Annual Meeting (AN26) July 5, 2026
One-day course, "From Data to Equations: Weak Form Methods for Discovering Models from Noisy Data", Cleveland, OH.
Weak-form equation discovery, WSINDy, noisy/sparse data modeling

The SLMath Summer School Jun 22-Jul 3, 2026
A two-week summer School on Mathematics of Generative Models,Berkeley, CA.
Understanding and Deriving underlying Mathematical framework used in Generative Models

The Erdős Institute Spring 2026
Data Science Boot Camp: Solar Panel Yields Prediction.
Impremented a Machine Learning framework to make accurate prediction of Solar Panel Yields to minimize losses by solar plants.

CIMPA Nairobi School Jul. 2025

A two week summer school on Data Driven epidemiological Models: Current Trends and new Threats.

Implemented and presented a group project on Bayesian Inference for Infectious Disease Modeling: An SIR-Model on Italy's COVID-19 Data

Certificate in Data Analyst Certificate Aug. 2024

A 3-months online course by CIW Certifications.

took an exam at the end of the course

Certificate of Competency on Fundamentals of Deep Learning Jun. 2024

A 4-day workshop at LSU by NVIDIA

Had a quiz at the end.

Certificate in Facilitating Learning Online Jun. 2023

1 Month online course at LSU

Weekly Assignments and a quiz at the end of the course

Certificate in Designing and Teaching Accessible Courses Mar. 2023

1 Month online course at LSU

Weekly Assignments and a quiz at the end of the course

Certificate in University Teaching Skills Dec. 2022

A 2-year online course at Saint Louis University

Weekly Assignments.

Developed and wrote a teaching philosophy.

Participated in a number of teaching skills and peer evaluation processes

Workshop on Simulations of Learning disabilities/Dyslexia Nov. 2022

1-day workshop at SLU by Churchill Center and School of Learning Disabilities

Got tools to identify learners with learning disabilities (dyslexia).

Understood (through simulations) what happens to learners during learning process.

Introduction to Online Teaching Apr. 2022

A 1 month online course at Saint Louis University by Reinert Center

Use of online tools, designing a course, Students engagement, Assessment and feedback.

3D Printing—Challenges and Applications. Jan. 2022

A Joint Mathematics Meetings (JMM) 2022 Short-course.

3D printing and the classroom: A discussion of the successes and failures of incorporating 3D printing in education.

Visualization of Mathematics with 3D printing

Certificate in Protecting God's Children for Adults Mar. 2021

By Saint Louis Archdiocese

Child Protection Policy

Certificate in Teacher Trauma Awareness Dec. 2012

At Dzaleka Refugee Camp, MALAWI

Child Protection Policy

Diplôme D'Études en Langue Française
(DELF A1 and DELF A2) Jul. 2007

At Alliance Française, Lusaka, ZAMBIA.
Basics and intermediate French speaking and writing

POSTER/PAPER PRESENTATIONS

(13) Research presentation. **Statistical Learning of Stochastic Reaction Networks from Random Event-Time Data.** Presented at The SIAM 2026 Annual Conference, held at the Huntington Convention Center of Cleveland, Cleveland, Ohio — July. 9, 2026

(12) Poster presentation. **Bayesian Inference for Infectious Disease Modeling: An SIR Model Case Study.** Presented at The SIAM 2026 Annual Conference, held at the Huntington Convention Center of Cleveland, Cleveland, Ohio — Jul. 7, 2026

(11) Research presentation. **Learning Reaction Rates from Product Formation-Time Data in Multiscale Stochastic Reaction Networks.** Presented at The 10^{th} Coastal Bend Mathematics & Statistics Conference, Hosted by Texas A&M University–Corpus Christi — Apr. 18, 2026

(10) Poster presentation. **Learning Reaction Rates from Product Formation-Time Data in Multiscale Stochastic Reaction Networks.** Presented at Mathematical Association of America (MAA), Louisiana-Mississippi Section, University of Louisiana at Lafayette — Feb. 28, 2026

(9) Poster presentation. **Bayesian Inference for Infectious Disease Modeling: An SIR Model Case Study.** Presented at African in Research Conference, LSU — Feb. 14, 2026

(8) Paper presentation. **Predicting Anthropometric Body Composition Variables Using 3D Optical Imaging and Machine Learning.** Presented at African Society for Biomathematics (ASB) Second Virtual Symposium — Dec. 03, 2025

(7) Poster presentation. **Safeguarding Autonomous Transportation: Deep Learning Strategies for Detecting Anomalies in Vehicle Sensor Data.** Presented at Math for ALL Conference - Tulane University — April 05, 2025

(6) **CPM-based Hierarchical Text Classification.** A paper by Biqing Zeng *et al.*. Presented at AI-Journal Club's bi-weekly meetings - LSU — March 20, 2025

(5) **Predicting appendicular lean mass (ALM), bone mineral density (BMD), and body fat percentage (BFP) using supervised Machine learning models.** Presented at Scientific Computing Around Louisiana (SCALA) Conference - Tulane University — March 14, 2025

(4) Poster presentation. **Predicting ALM, BFP and BMD supervised and semi-supervised Machine learning models.** part of LSU's Math Consultation Clinic and Pennington Bio-Medical Research Center. We made 2 poster presentation — 2024

(3) Poster presentation. **Using Machine Learning to predict Stock Prices.** Project worked by a team of 5. Presented at LSU — Spring 2023

(2) **A Real-World Application of Minimum-Spanning-Tree Algorithm.** Presented at LSU — Spring 2023

(1) **Parking Functions.** Presented at the '47th Annual New York State Regional Graduate Mathematics Conference,' (Syracuse University). — Apr. 2022

RESEARCH PROJECTS

(4) A joint Project. **Safeguarding Autonomous Transportation: Deep Learning Strategies for Detecting Anomalies in Vehicle Sensor Data.** a team comprised of members from various academic and industrial institutions — 2024

(3) A joint Project. **Predicting Appendicular Lean Mass, Bone Mineral Density and Body Fat Percentage Using Supervised and p-Laplacian Based Semi-Supervised Learning.** LSU's Math Clinic Consultation and Pennington Bio-Medical Research Center. — 2024

(2) A Class Project. **Using Machine Learning to predict Stock Prices.** Worked on a team of 5. — Spring 2023

(1) A Class Project. **A Real-World Application of Minimum-Spanning-Tree Algorithm.** — Spring 2023

PUBLICATIONS

(2) with Gyaneshwar Agrahari, Nadidja Drenska, *et al.*, **Predicting anthropometric body composition variables using 3D optical imaging and machine learning.** Published in *Frontier in Bioinformatics, Sec. Integrative Bioinformatics, Vol. 6*. Accepted February 17, 2026. — May 12, 2026

(1) with Elvin Eziama, Remigius Diovu Chidiebere, *et al.*, **Safeguarding Autonomous Transportation: Deep Learning Strategies for Detecting Anomalies in Vehicle Sensor Data.** in Proceedings of Tenth International Congress on Information and Communication Technology. ICICT 2025, vol. 6, London, Springer. — March 2025

SUBMITTED AND IN PREPARATION

None

STUDENT ADVISING/ MENTORING

(6) **Undergraduates**, *MATH 4020 Capstone Course.*:

- Supervised three undergraduate project groups; provided technical guidance, conceptual explanations, project planning support, and mentorship to help students grow as independent researchers.
- Prepared students to present their findings to peers and professionals.
- **Project 1: Oyster Image Annotation and Counting (3 students)**
  - Annotated oyster images (0–2 mm) placed on dishes for dataset creation.
  - Implemented Vision-Language Models and YOLOv10 architectures for object detection and automated counting.

  Fall 2025
- **Project 2: GUI Application for Counting Oysters and Frog Eggs (2 students)**
  - Developed an interactive GUI application to simplify counting and record-keeping of annotated oysters and frog eggs.
  - Improved interface functionality, design flow, and usability.
- **Project 3: Underwater Optical Communication (2 students)**
  - Researched how light rays used by submersible vehicles for communication are affected by absorption.
  - Modeled absorption effects and interpreted physics-based signal degradation.

(5) **Juan Silvera, Michael Murphy, Melisande Mayo and Sebastien Swain**: "Inferring Physiological Activities from Glucose Dynamics Using Hidden Markov Models", *High School students.* Fall 25 - Spring 26

(4) **Krishiv Agrawal**: "CModeling Physical Activity Dynamics Using a Continuous-Time Markov Chain", *High School students.* Fall 25 - Spring 26

(3) **Jackson S Pleasant**: "Generative Models." *Louisiana State University (LSU).* Fall 2025

(2) **Elizabeth Francis**: "Naive Baye's Learning: Predicting MLB's Postseason Appearances." *Louisiana State University (LSU).* Fall 2024

(1) **Thomas Emerick**: "Probability & Data Visualization." *Louisiana State University (LSU).* Spring 2024

VOLUNTEER TASKS AND OTHER VOLUNTARY TEACHING EXPERIENCES:

Food Recovery Network at LSU Fall 2025 - Present

Louisiana State University, Baton Rouge, LA. USA

Assist with food repackaging into ready to go lunch boxes. Stock the boxes in strategic places for students to collect. Cleaning the test kitchen.

Orientation Leader for New LSU Students Summer 2025 - Present

Global Communication Center (GCC), LSU, Baton Rouge, LA. USA

Communicated with incoming students and addressed their questions and concerns to help them transition smoothly into life at LSU.

Provided guidance on academic expectations, campus resources, and student life to ensure new students felt supported and welcomed.

Actively participated in Fall and Spring Orientation Day events, assisting with check-in, leading small-group discussions, and facilitating informational sessions.

Helped create a positive and inclusive environment by engaging with students from diverse backgrounds and connecting them to appropriate campus services.

Mathematics Instructor Spring 2026 - Present

Math Circle Academy, Department of Mathematics, Louisiana State University, Baton Rouge, LA. USA

Teaching and tutoring intermediate-level students in a range of high school mathematics subjects, fostering problem-solving and analytical thinking skills.

Chief of Mathematical Practice Spring 2025 - Fall 2025

Math Circle Competition Team (MCCT), LSU, Baton Rouge, LA. USA

Coached high school students preparing for regional and national/international mathematics competition. Meeting every Sunday during the semester.

Food pantry helper Spring 2024 - Present

Louisiana State University, Baton Rouge, LA. USA

Assisted with food distribution to students. Cleaning the pantry, arranging food items on shelves, offloading food donations.

LHSRA Exam Proctor Spring 2023, 2024, 2025

Louisiana State University, Baton Rouge, LA. USA

Assisted the Louisiana High School Rally Association (LHSRA) by proctoring statewide academic competitions in Calculus I and Business Computer Applications. Ensured a fair, secure, and well-coordinated testing environment for high school participants, while supporting the smooth administration of event procedures.

Mentoring High School Students Fall 2025 – Present

Louisiana State University, Virtual Math Research Circle, Baton Rouge, LA., USA.

Directed seven high school students doing independent study on Continuous time Markov Chain (CTMC) and Hidden Markov Models (HMM) to predict future events- Fall 2025.

Site-Coordinator for LSU's GEAUX BIG Events Mar. 2025

LSU's Community outreach events, Baton Rouge, LA. USA

Coordinated two events: The first one at Food Pantry to assist distribution of food to needy students. The second event was painting walls of Global Community Center.

Mentoring Undergrad Students Jan. 2024 – Present

Louisiana State University, Department of Mathematics, Baton Rouge, LA., USA.

Directed a sophomore doing independent study on Naïve Bayes Classification: Using Machine Learning to predict MSB Post-season appearances - Fall 2024.

Directed a freshman doing independent study on Probability and Data Visualization - Spring 2024.

Retail salesperson Aug. – Dec. 2023, 2024, 2025

LSU SportShop, Fanatics, Baton Rouge, LA. USA
Selling LSU-branded merchandise during football games inside the shop and/or stadium.

Mathematics Curriculum Developer Oct. 2021 – Dec. 2022

The proposed Hekima University, The East African Province of the Society of Jesus, Nairobi, KENYA.
Researched and compared various undergraduate mathematics programs.
Wrote the curriculum and syllabus for B.Sc. Mathematics and B.Ed. Mathematics.
Proposed Mathematics courses and content to be done by students in other majors.

Mathematics Teacher Apr. 2020 – Dec. 2020

Google Classroom online tutoring, Lusaka, ZAMBIA.
Offered free lessons to learners during the pandemic.
Recorded and uploaded lessons, gave homework, graded and gave personalized feedback.

Mathematics Teacher Apr. 2020 – Dec. 2020

Google Classroom online tutoring, Lusaka, ZAMBIA.
Offered free lessons to learners during the pandemic.
Recorded and uploaded lessons, gave homework, graded and gave personalized feedback.

Mathematics Teacher Jun. 2018 – Jul. 2018

Loreto High School-Matunda, Uasin Gishu, KENYA
Tutored mathematics for 8 weeks to high school students

Mathematics Teacher Jan. 2017 – Jun. 2017

St. Ignatius College, Lusaka, ZAMBIA.
Teaching Mathematics to high school students following Cambridge IGCSE Syllabus and also Examination Council of Zambia's (ECZ) syllabus.

Mathematics Teacher Jan. 2016 – May 2016

Ibenga Girls Secondary School, ZAMBIA.
Offered free mathematics tutoring sessions to freshmen and sophomores

Mathematics Teacher Jan. 2014 – Dec. 2016

The Copperbelt University, Kitwe, ZAMBIA.
Offered free mathematics tutoring sessions to freshmen and sophomores

Project Officer (Intern) Mar. 2015 – Jun. 2015

Jesuit Centre for Ecology & Development, Lilongwe, MALAWI
Writing project proposals for funding, conducting outreach sensitization sessions on climate and efficient energy saving stoves.

Mathematics Teacher Jan. 2008 – Dec. 2010

St. John's High School, Emerald Hill, Harare, ZIMBABWE.
Tutoring mathematics to high school students once a week

Mathematics Teacher Jun. 2002 – Oct. 2002

Nankhunda Minor Seminary, Zomba, MALAWI.
Tutoring mathematics to junior high school students

LEADERSHIP

President Jan. 2026 – Present

LSU SIAM Student Chapter, Baton Rouge, LA. USA.

Linking the club with the LSU's department of Mathematics and the industries/organizations.

Integration Officer May 2025 – Present

African Graduate Student Association at LSU, Baton Rouge, LA. USA.

Organizing welcoming event for the new students.

Liaison Officer Jan. 2025 – Dec. 2025

LSU SIAM Student Chapter, Baton Rouge, LA. USA.

Linking the club with the LSU's department of Mathematics and the industries/organizations.

Organizing Team Member May 2024 – Present

AI Journal Club, Baton Rouge, LA. USA.

organizing bi-weekly events. AI-JC is interdisciplinary community where the Physics and Astronomy Department, the Department of Mathematics, and the Computer Science Department come together to explore the transformative potential of Artificial Intelligence in scientific data analysis, using a hands on approach. In Fall 2025, We adopted a coordinated, hands-on approach using an Oracle-MNIST dataset: we successfuly designed, trained, and evaluated a convolutional neural network, implementing the LeNet-5 architecture entirely from scratch.

Coordinator Aug. 2021 – Dec. 2022

SLU-Mathematics Club, Saint Louis, MO., USA.

organizing weekly events, searching for presenters for each event

Coordinator Aug. 2018 – May. 2020

Drama Club, Hekima University College, Nairobi, KENYA.

Recruiting actors and actresses for each play performed, Organizing rehearsals and ensure all participants are available by transporting them, organizing two annual drama night festivals to showcase performances for free

Coordinator Aug. 2009 – May. 2010

Arrupe College Choir, Harare, ZIMBABWE.

Organizing weekly choir practices, preparing and organizing the choir to record an album.

NON-MATH PUBLICATIONS

(2) Maganizo Jacob Kapita and Hawa Simbi Banda. Leading by Presence: Mother's Leadership Model. In *Kisima: An Ecumenical Magazine for Christian Mothers*, Issue 4, pp. 11-13. 2021

(1) Jacob Kapita. Dzaleka: Gold in Dust. In *The Lamp Magazine.* Issue 99, p. 3. 2012

AFFILIATIONS

AI Journal Club, Organizing Team member — 2024-present

SIAM member — 2023-present

AMS member — 2021-present

SAMSA member — 2019-present

COLLABORATIONS

The Pennington Biomedical Research Center, through LSU's Math Consultation Clinic (MC^2) — 2024 - present

UNDERGRADUATE COURSES TAUGHT: INSTRUCTOR OF RECORDS

General Roles:

- *Independently led a full section of College Algebra and Differential Calculus, including preparing lecture notes, delivering instruction, and managing the classroom environment.*
- *Delivered lectures connecting algebraic concepts to real-world applications to enhance student engagement and relevance.*
- *Held regular office hours, provided individualized support, and encouraged active class participation.*
- *Cultivated an inclusive, respectful classroom atmosphere and promoted collaborative learning.*

Louisiana State University:

- Math 1530: Differential Calculus — Spring 2026
- Math 1020: Co-requisite Support for Math 1021 College Algebra — Spring 2024-Spring 2025
- Math 1021: College Algebra — Spring 2024-Spring 2025

Saint Louis University:

- Math 1200: College Algebra — Spring 2022 - Fall 2022

TEACHING ASSISTANT AND GRADING COURSES

General Roles: Grading and Tutoring

- *Evaluated homework, quizzes, and exams for multiple courses, including Actuarial Mathematics, Interest Theory, Calculus II, and Calculus III.*

- *Provided detailed written feedback to support student learning and identify areas for improvement.*
- *Ensured consistent grading across assignments by grading one question for all students before moving to the next.*
- *Maintained accurate grade records and communicated regularly with supervising faculty about student progress.*

- *Offered one-on-one and small-group tutoring for students in College Algebra and Trigonometry.*
- *Helped students build problem-solving skills, prepare for exams, and strengthen foundational algebra competencies.*
- *Demonstrated empathy, patience, and strong communication skills, fostering a positive and supportive learning environment.*
- *Collaborated with faculty to identify struggling students and develop targeted support strategies.*
- *Taught Actuarial Mathematics and Interest Theory classes when faculty members were unavailable.*

Louisiana State University:

- Math 4020: Capstone Course - Machine Learning and Applications (Teaching Assistant under Dr.Nadejda Drenska) *[Fall 2025]*
- Math 4045–4046: Long-term Actuarial Mathematics *[Fa.23-Fa.25]*
- Math 4040–4041: Short-term Actuarial Mathematics *[Fa.23-Fa.25]*
- Math 3050: Interest Theory *[Fa.23,Fa.25]*
- Math 1550: Differential and Integral Calculus *[Spring 2023]*
- Math 1552: Analytic Geometry and Calculus II *[Spring 2023]*

Saint Louis University:

- Math 1510: Calculus I *[Fall 2021]*

AWARDS, HONORS AND FUNDING

SIAM Annual Meeting Travel Award July 2026

Received $650 travel funding to attend the SIAM Annual Meeting (AN26), Cleveland, OH.
Travel Award

SLMath Summer School Full Board Award Summer 2026

Awarded full board (travel, housing and meals covered) to attend the SLMath (Mathematical Sciences Research Institute) summer graduate school.
Fellowship/Award

Certificate of Teaching Excellence in recognition of Outstanding Teaching by a Graduate Student in the Department of Mathematics at Louisiana State University, (Spring 2026)	May, 7 2026
Andrews award for outstanding graduate student for scholarship and service to the department at Saint Louis University, (2021 – 2022 AY)	Spring 2022
The best third year student in Bachelor of Science in Mathematics Education for the academic year 2015-2016, The Copperbelt University	Nov. 2016
The best First year student in Bachelor of Science in Mathematics Education for the academic year 2013-2014, The Copperbelt University	Nov. 2014

SKILLS:

Software and Computer Languages: R, Python, Julia, Matlab, Mathematica, mySQL and other Relational Databases, SAS, STATA, LaTeX, Windows Office, GitHub, SPSS, 3D Printing, Google Classroom, Canvas, Zoom, Gather
Languages: Chichewa (Native), English (Fluent), Nyanja (Proficient), French (basic), Swahili (Intermediate), Shona (Intermidiate), Bemba(Basic),