



Integrating Virtual Labs in STEM Teaching

1 December 2025 – 28 February 2026

Integrating Virtual Labs in STEM Teaching will introduce you to interactive STEM simulations through PhET and other virtual labs based on open educational resources (OER). With PhET simulations as our primary tool, you will have the opportunity to develop a deeper understanding of fundamental principles and practical approaches to technology-supported teaching and learning across various STEM disciplines and at all levels: primary, secondary, and post-secondary.

From physics and chemistry to biology and mathematics, you will learn how simulations and other OER-based virtual labs can bring abstract concepts and complex theories to life to uncover the interconnectedness of scientific phenomena, enhancing your critical thinking and problem-solving skills. You will also learn how to access and evaluate OER, expanding your pedagogical and digital competences. Finally, you will gain strategies to improve the participation of women and girls, as well as men and boys, in STEM learning.

This OER-based course emphasises active learning and collaboration, with opportunities for discussions in communities of practice, peer teaching, eportfolios, and project-based assessments. Over the duration of the course, STEM and pedagogy experts will guide you through the development of learning situations that are culturally and gender sensitive, and can be implemented for a broad diversity of students in the STEM classroom.

By the end of the course, you will not only have a newfound appreciation for the power of simulations and OER-based virtual labs in STEM education but also possess the skills to leverage these resources effectively in your academic and professional pursuits.

<i>Schedule</i>	Start date: 1 December 2025 End date: 28 February 2026
<i>Intended audience</i>	Secondary and tertiary STEM teachers, student teachers, teacher educators, and instructional designers from around the world
<i>Language</i>	English
<i>Pacing</i>	Self-paced, completing within 5 weeks
<i>Expected workload</i>	25 hours total (3-5 hours per week)
<i>Challenge level</i>	Introductory
<i>Prerequisites</i>	None
<i>Certification</i>	Certificates of Participation and Completion available (at no charge)

Who should take this OER course?

This course is open to teachers, student teachers, teacher educators, and instructional designers. You will gain insight into the latest advancements in virtual labs and simulations, and learn how to integrate them into your STEM teaching through enriched and innovative practice.

This course will be relevant for anyone involved in Biology, Chemistry, Physics, or Mathematics Education, as well as any science or technology discipline. Register now and join us in shaping the future of STEM education!

Partners

AFRICA

Botswana	 Botswana Teaching Professionals Council (BOTEP/C)
South Africa	South African Council for Educators (SACE) 
Uganda	 Uganda National Institute for Teacher Education (UNITE)

THE CARIBBEAN

Belize	 Teacher Learning Institute (TLI)
Jamaica	Jamaica Teaching Council (JTC) 
St Kitts & Nevis	 Clarence Fitzroy Bryant College (CFBC)

For more information and
to register, visit

<http://vlabsinstem.org>

For queries, contact the
course team at
info@vlabsinstem.org

Course team

This course is designed and coordinated by Dr Evode Mukama and Dr Schontal Moore (COL), with support from Dr Ramashego Mphahlele (UNISA) and technical assistance from Daniel Wilton (Athabasca University).

Your team of facilitators from the University of Rwanda-College of Education and other institutions in Rwanda will provide you with support during the course through communities of practice in Biology, Chemistry, Physics, and Mathematics, allowing you to focus your learning within your specific STEM discipline while staying connected to the full community.



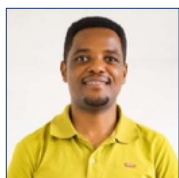
MARCELLIN RUTEGWA

Marcellin Rutegwa, PhD, teaches Biology to pre-service secondary school teachers at the University of Rwanda-College of Education. He is the coordinator of STEM Education PhD programmes.



PRISCA BYUKUSENGE

Prisca Byukusenge is an Assistant Lecturer of Chemistry and a Chemistry Laboratory Coordinator at East African Christian College. She has a Master's Degree in Chemistry Education and is passionate about innovative and active approaches to teaching and learning.



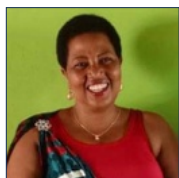
LEONARD NUNGU

Leonard Nungu holds a M.Ed in Chemistry Education from the University of Rwanda and a B.Ed (Science) from the University of Malawi. He teaches chemistry and science at Wellspring Academy, a Cambridge International School in Kigali, Rwanda.



VICTOR DUSABUMUREMYI

Victor Dusabumuremyi, MSc, is Assistant Lecturer of Physics at the University of Rwanda, specialising in applied physics and physics education, with over twenty years of teaching experience at various levels.



PASCASIE NYIRAHABIMANA

Pascasie Nyirahabimana, PhD, is a Senior Lecturer of Physics and Head of the Department of Mathematics, Science, and Physical Education at the University of Rwanda-College of Education. Her work centers on advancing STEM through multimedia.



JEAN CLAUDE DUSHIMIMANA

Jean Claude Dushimimana is Mathematics Lecturer at the University of Rwanda-College of Education. He specialises in science education focusing on ICT integration in mathematics teaching and learning.

Course outline

1 *Introduction to STEM Teaching with Technology*

- 1.1 Introduction to inquiry-based learning
- 1.2 Principles of online teaching and learning
- 1.3 Virtual labs and active learning

2 *Using PhET Simulations and OER*

- 2.1 Introduction to simulations and virtual labs
- 2.2 Visualisation and exploring concepts with virtual labs
- 2.3 Integrating virtual labs and OER
- 2.4 Other virtual labs for STEM teaching

3 *Blended Learning with Virtual Labs*

- 3.1 Principles of blended learning in STEM
- 3.2 Blended learning structures and strategies
- 3.3 Integrating simulations and virtual labs into blended learning

4 *Lesson Planning for Virtual Lab Activities*

- 4.1 Designing inclusive lesson plans in STEM education while integrating virtual labs
- 4.2 Gender strategies for STEM education
- 4.3 Assessment of virtual lab activities

5 *Evaluation and Best Practices with Virtual Labs*

- 5.1 Evaluating lesson plans with simulations and virtual labs
- 5.2 Reflecting on best practices in teaching with virtual labs
- 5.3 Preparing for sustained use of virtual labs and OER

Certification

Two levels of certification are available at no charge, based on your level of participation and completion of tasks and activities.

- **Certificate of Participation** requires 70% or more on each weekly multiple-choice quiz and participation in at least three discussion forums.
- **Certificate of Completion** requires 70% or more on each quiz, participation in at least three discussion forums, and successful completion of a lesson plan.

