Course Outline

Annual International Training Course

1. **Course Title**:
   Phage Display Biotechnology
2. **Duration**:
   2 weeks **(1 – 31 August 2023)**
3. **Background**:

Thailand International Cooperation Agency (TICA)

TICA is a national focal point for Thailand's international development cooperation. It was established in 2004 to realize Thailand's aspiration to be a contributor to international development cooperation. Believing that global challenges are best addressed through international cooperation and global partnership, TICA continues to work closely together with its development partners to realize the global development agenda through various capacity-building and human resources development programmes. In response to the recent changes in the global landscape of development cooperation, TICA has strengthened its partnerships to harness the synergy of South-South and Triangular Cooperation to tackle global development challenges, including expediting the implementation of Sustainable Development Goals (SDGs). It also continues to realign our focuses in order to deliver Thailand's commitments as a global reliable partner.

Since 1991, TICA, in collaboration with educational institutions in Thailand, has offered short-term training courses under its Annual International Training Course (AITC) programme. The number of courses offered each year varies between 25 to 35 courses for 20-35 participants per course. AITC not only fosters good and friendly relations which Thailand has already enjoyed with recipient countries across regions, but also helps Thailand to reach out to those countries with which we desire to engage more closely. The courses offered by TICA in 2023-2025 are categorized into 5 themes: Sufficiency Economy Philosophy (SEP), food security, climate change and environmental issues, public health, BCG Model related.

Organization/Institution

Suranaree University of Technology/Institute of Agricultural Technology School of Biotecnology

4. Objectives:

The program is designed to:

1. give participant an overview of phage display technology, its principle and various applications as well as explain how this technology can contribute to sufficiency economy philosophy (SEP)
2. teach participants about how to obtain specific peptides and antibodies to target of interests from the phage display library
3. teach participants about the discovery and production of recombinant antibody for therapeutic and diagnostic purposes
4. enable participants to continue their own research work on phage display technology
5. establish a network of scientists on phage display research in accordance with sufficiency economy philosophy (SEP)

5. Course Contents:

This course will provide an overview of phage display biotechnology, including its definition, history, and applications. Participants will learn about the phage display process and strategies for constructing diverse libraries of phage-displayed peptides and antibody fragments. They will also learn about techniques for screening and selecting phage-displayed peptides and single change fragment variable (scFv) of antibodies, as well as methods for characterizing their binding properties.

The course will also cover the use of phage display in drug discovery and development, including the identification of potential drug targets. The issues regarding how phage display biotechnology can foster sufficiency economy philosophy will be discussed, as well as current challenges and limitations in the field. Finally, the course will explore potential future developments in phage display biotechnology.

Throughout the course, students will have the opportunity to learn through actual research problems and VDO demonstration of all key techniques in phage display biotechnology. Therefore, they will be equipped with the knowledge and skills to conduct their own phage display research. By the end of the course, participants will have a comprehensive understanding of the principles and applications of phage display biotechnology.

6. Participants' Criteria:

Applicants must fulfill the following requirements:

- Be nominated by their respective governments.
- Education: graduated students to higher.
- Language: proficiency in English (reading and writing)

7. Attendance and Evaluation

Participants who complete the training will receive a certificate based on:

- Class attendance (not less than 80%)
- Performance evaluation

8. Venue:

Online via Suranaree University of Technology e-learning platform.

9. Expected Results:

- Participants will gain their knowledge about phage display technology and can apply for their own research
- An international research network on phage display technology will be expanded and established

10. Organization/ Institution:

- **Implementing Agency;** Molecular Biotechnology Laboratory, School of Biotechnology, Suranaree University of Technology (MYLab – SUT)
- **Contact Person;**

  1. Prof.Dr. Montarop Yamabhai
  Head of Molecular Biotechnology Laboratory, School of Biotechnology, Suranaree University of Technology
  Email: montarop@g.sut.ac.th
  2. Dr. Kuntalee Rangnoi
  Postdoctoral researcher of Molecular Biotechnology Laboratory, School of Biotechnology, Suranaree University of Technology
  Email:kuntaleerang@gmail.com

11. Expenditure/Funding:

Thailand International Cooperation Agency (TICA)
Government Complex, Building B (South Zone), 8th Floor,
Chaengwattana Rd. Laksi District, Bangkok 10210 THAILAND
Website: https://tica-thaigov.mfa.go.th/en/index
Email: aitc@mfa.go.th

Schedule for the Online Training Programme:

Phage Display Biotechnology

Date/ Period /Topic	Duration Time	Content	Speaker	Note
Week 1 Introduction & Phage Display peptide Library				
Day 1 :				
	30 min 1 hr 1 hr	Lecture - Introducing participant - Principles and applications of phage display - How phage display biotechnology can support sufficiency economy philosophy (SEP)	Prof.Dr. Montarop Yamabhai Prof.Dr.Montarop Yamabhai Prof.Dr.Montarop Yamabhai	Links to the online course will be announced later
	1 hr 1 hr 30 min 30 min	Lecture - Vectors for phage display - Construction of phage peptide libraries - Screening phage peptides and its applications - Microbiological methods for phage display	Dr.Nantanit Jaruseranee Prof.Dr. Montarop Yamabhai Dr. Kuntalee Rangnoi Dr. Kuntalee Rangnoi	Links to the online course will be announced later

Date/ Period /Topic	Duration Time	Content	Speaker	Note
Day 2 :				
	30 min	Lecture - An overview of phage display peptide screening Part I	Dr. Kuntalee Rangnoi	Links to the online course will be announced later
	1 hr	Video demonstration protocol Phage display peptide screening - Biopanning first round - Phage amplification	Prof.Dr. Montarop Yamabhai Dr.Nantanit Jaruseranee Dr. Kuntalee Rangnoi	Links to the online course will be announced later
Day 3 :				
	30 min	Lecture An overview of phage display peptide screening Part 1I	Dr. Kuntalee Rangnoi	Links to the online course will be announced later
	1 hr	Video demonstration protocol Phage display peptide screening day 3 - Biopanning second and 3 round - Isolation of affinity-selected phage clones - plaque amplification	Prof.Dr. Montarop Yamabhai Dr. Thae Thae Min Dr. Kuntalee Rangnoi	Links to the online course will be announced later
Day 4 :				
	30 min	Lecture An overview of phage display peptide screening Part 1II	Dr. Kuntalee Rangnoi	Links to the online course will be

				announced later
	1 hr	Video demonstration protocol - Propagation of Individual Phage Clone	Prof.Dr. Montarop Yamabhai Dr. Thae Thae Min Dr. Kuntalee Rangnoi	Links to the online course will be announced later
Day 5 :				
	30 min	Lecture An overview of phage display peptide screening Part IV	Prof.Dr. Montarop Yamabhai	Links to the online course will be announced later
	1 hr 1 hr	Video demonstration protocol - Phage ELISA - Sequence analysis and database analyzing	Dr. Kuntalee Rangnoi Prof.Dr. Montarop Yamabhai	Links to the online course will be announced later
	30 min	Q &A session	Dr. Kuntalee Rangnoi Prof.Dr. Montarop Yamabhai	Links to the online course will be announced later
Assignment /Quiz				
Week 2 Phage display antibody technology				
Day 1 :				
	1 hr 1 hr	Lecture - Antibody and its formats - Phage display antibody library construction and Yamo I library	Prof.Dr. Montarop Yamabhai	Links to the online course will be announced later

			Dr.Potjamas Pansri	
	2 hr	Video demonstration protocol Phage display antibody screening Part I - Biopanning first round - Amplification of binding phage - Phage titration	Prof.Dr. Montarop Yamabhai Dr. Thae Thae Min Dr. Kuntalee Rangnoi	Links to the online course will be announced later
Day 2 :				
	2 hr	Lecture Selection of antibody specific to target antigen by Phage display antibody technology	Dr. Thae Thae Min	Links to the online course will be announced later
	2 hr	Video demonstration protocol Phage display antibody screening Part III - Phage amplification and helper phage infection - Phage precipitation - Monoclonal phage rescue	Prof.Dr. Montarop Yamabhai Dr. Thae Thae Min Dr. Kuntalee Rangnoi	Links to the online course will be announced later
Day 3 :				
	2 hr	Lecture - Antibody engineering	Prof.Dr.Florian Ruker	Links to the online course will be announced later
	2 hr	Video demonstration protocol Phage display antibodyscreening Part III Monoclonal phage ELISA	Prof.Dr. Montarop Yamabhai	Links to the online course will be

			Dr. Thae Thae Min Dr. Kuntalee Rangnoi	announced later
Day 4 :				
	30 min 1 hr 1 hr	Lecture - Recombinant antibody production in bacteria and cell lines - Cell line development for recombinant antibody production - MY Lab antibody production platform	Dr. Thae Thae Min Prof.Dr. Montarop Yamabhai Prof.Dr. Montarop Yamabhai	Links to the online course will be announced later
	1hr 30 min	Video demonstration protocol Phage display antibody screening Part IV Analysis of selected antibodies	Prof.Dr. Montarop Yamabhai Dr. Thae Thae Min Dr. Kuntalee Rangnoi	Links to the online course will be announced later
Day 5 :				
	2 hr	Lecture Examples of therapeutic and diagnostic antibody derived from phage display	Prof.Dr. Montarop Yamabhai Dr.Martina Jones	Links to the online course will be announced later
	2 hr	Video demonstration protocol Antibody expression and purification	Prof.Dr. Montarop Yamabhai Dr. Thae Thae Min	Links to the online course will be announced later

			Dr. Kuntalee Rangnoi	
	30 min	Q &A session	Dr. Kuntalee Rangnoi Prof.Dr. Montarop Yamabhai	Links to the online course will be announced later
Exit Exam				Links to the exam will be announced later