# A logo of a university Description automatically generated School of Bioresources and Technology

P.1

# King Mongkut’s University of Technology Thonburi

Thesis Committee Nomination Form

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Name-Surname ……….…………………… Student ID ……………………...……….…

e-mail : …………………………………….. Telephone No……………………………..

🞎 Doctoral degree 🞎 Master degree Thesis …………………………Credits

Program

🞎 Doctor of Philosophy…………Field of Study …………………………

🞎 Master of Science…………….Field of Study …………………………

🞎 Master of Engineering….…….Field of Study …………………………

🞎 Master of Arts………………...Field of Study …………………………

**Title** Thai ……………………………………………………………

English …………………………………………………………….

1. Advisor …………………………………….. ………………………....................

Affiliation ………………………………………………………………...............

Academic qualification …………………………………………………...............

Expertise ………………………………………………………………………….

Member(s) of candidate(s) under supervision as advisor

Doctoral degree ………………………….. Master degree ………………………

Member(s) of candidate(s) under supervision as co-advisor

Doctoral degree ………………………….. Master degree ………………………

1. Co-advisor ……………………………………………………………..................

Affiliation ………………………………………………………………...............

Academic qualification …………………………………………………...............

Expertise ………………………………………………………………………….

Member(s) of candidate(s) under supervision as advisor

Doctoral degree ………………………….. Master degree ………………………

1. Member(s) of candidate(s) under supervision as co-advisor

Doctoral degree ………………………….. Master degree ………………………

Affiliation ………………………………………………………………...............

Academic qualification …………………………………………………...............

Expertise ………………………………………………………………………….

Member(s) of candidate(s) under supervision as advisor

Doctoral degree ………………………….. Master degree ………………………

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Affiliation ………………………………………………………………………

Academic qualification …………………………………………………………...

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Academic qualification …………………………………………………………..

Expertise ………………………………………………………………………….

1. Observer (if any)…………………………………………………………………..

Affiliation ………………………………………………………………………...

Academic qualification …………………………………………………………..

Expertise ………………………………………………………………………….

**Note\* 1.** Total number of candidates (excluding candidates enrolled in the current semester)

**2.** In case of external experts and members from other KMUTT faculties, please attach Curriculum Vitae (CV)

Signature ………………………………… Advisor Date …………..…………….

Signature ………………………………… Head of Division Date …………………………

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| --- | --- |
| Official use onlyThesis committee conforms to the guidelines for Higher Education Program Standard Criteria B.E.2558 , item 10.3 and item 10.4Checked by.......................................................(........Rungarun Waisayawan…………...) | Thesis Committee is approved by SBT Academic Committee on ……………………………………Signature................................................................(Asst.Prof.Dr.Sudarut Tripetchkul)Associate Dean for Academic Affairs |

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# School of Bioresources and Technology

# King Mongkut’s University of Technology Thonburi

Thesis Proposal

........................................................

**Title** (Thai) ……………………………………………………………………………

(English) ……………………………………….………………………………………….

1. **Background of the study** (not more than 3 pages)

Background of the study contains the rationale, the key problem statement, and a brief overview of research questions, explaining why it is of academic and or practical importance. The significance of previous related research must be included in the study's background.

Example:

In 2018, NCDs caused 41 million global deaths, with cancer responsible for 9.6 million deaths, including 2.1 million breast cancer cases (15% of female cancer deaths). Drug resistance is a major issue, causing 90% of cancer-related deaths. Combining drugs targeting different pathways offers hope for countering drug resistance and slowing cancer growth. Computational tools for predicting drug combinations are valuable for breast cancer therapy.

Drug synergy prediction models range from conventional machine learning to deep learning. Ensemble models are common in machine learning. For example, Sidorov et al. (2019) integrated drug structure and gene expression data to predict lymphoma cell line drug combinations (AUC 0.89). Jeon et al. (2018) developed Extremely Randomized Trees for drug synergy prediction across cancers (correlation 0.73, F1 score 0.95). Deep learning models also exist, including GCN-based models, autoencoders, and PCA-based models. Preuer et al. (2018) developed Deep Synergy for pan-cancer drug synergy prediction (Pearson Correlation 0.73, AUC 90%). Despite high performance, machine learning lacks interpretability. Mechanistic models, such as Boolean formalisms, explain drug interactions. Gómez et al. (2017) used a Boolean model for ER+ PI3KCA-mutant breast cancer drug synergy prediction, revealing mechanisms and validating predictions experimentally. For pan-cancer studies, CASCADE models (CASCADE 2.0 and CASCADE 3.0) were developed to capture drug synergy across multiple cancer types, with CASCADE 3.0 showing improved performance by incorporating omics data.

Both machine learning and mechanistic models have strengths and weaknesses. Machine learning excels in prediction but lacks explanations. Mechanistic models provide mechanistic insights but may have limited generalizability. This study proposes a hybrid approach, integrating mechanistic modeling simulations into a deep learning model to identify cancer drug synergy.

1. **Hypothesis of the study**

A research hypothesis is a statement of expectation or prediction that will be tested by research. To be considered a quality hypothesis, the statement must have three characteristics: specificity, clarity, and testability.

Example 1:

It's hypothesized that including mechanistic modeling simulations as features will outperform traditional features (drug structures, target proteins, cell line omics profiles) for drug synergy prediction.

Example 2:

Students who sleep at least 8 hours per night will, on average, achieve higher grades in standardised tests than students who sleep less than 8 hours a night.

1. **General Objective(s) or Specific objective(s)** (The objective can be either general or specific, or both general and specific.)

General Objective(s) are board goals that must be met. The study's general objectives state what the researcher expects the study to achieve in general terms. To achieve specific objectives, general objectives can be broken down into small logically connected parts.

**Example 1**

General Objective

* To determine how work environment affects performance.

Specific objectives

* To Determine whether sunlight improves performance.
* To Measure how performance changes when work environment changes.

**Example 2**

General Objective

* To proposes a hybrid method for combining mechanistic modeling simulations as a feature in a deep- learning model to identify synergistic effects between cancer drugs.

Specific objectives

* To develop a hybrid model combining mechanistic modeling and deep learning to predict drug synergy in breast cancer treatments.
* To use the model to identify novel combinations between herbal compounds from Thai natural sources and currently available molecularly targeted drugs that synergistically cure cancer.

**Example 3**

General Objective

* To develop a batter system for squid meat.

Specific objectives

* To study the effects of using native and modified cassava flours in coating batter formulations on the quality of deep-fat fried squid rings.

1. **Research Methodology (not more than 1 page)**

Research methodology is the specific procedures or techniques used to identify, select, process, and analyze information about a topic. In a research paper, the methodology section allows the reader to critically evaluate a study's overall validity and reliability.

**Example1:**

1) Sample: Cassava flour (Piroon 4 cultivar)

2) Preparation of batter system based on native cassava flour. The basic formulation will be

derived from the literatures.

3) Preparation of battered fried squid ring:

- Coating: Before frying, squid ring samples are individually immersed in batter suspensions for 10 seconds.

- Batter pick-up: Batter pick-up is calculated by dividing the weight of coated squid rings by the weight of non-coated squid rings and multiplying by 100.

- Deep fat frying: the batter-coated squid ring is deep fat fried at 180°C in a commercial bench-top deep fat fryer with 2.5 L palm oil. For 3 minutes, samples are fried.

4) Characterization of the fried squid ring.

- The external structure is observed by a digital camera.

- After frying, the color of the coatings is measured using a color meter (Hunter Lab).

- Fried batter microstructure is observed under Scanning electron microscopy (SEM).

5) Modification of cassava flour by heat-moisture treatment (HMT):

Cassava flour's moisture content is adjusted to the desired moisture content (25% and 30%) by soaking overnight at 4 °C. The excess water in the equilibrated slurry is vacuum suctioned out to produce a starch cake. Air-drying the starch cake allows the moisture content to drop to the desired level. Starch samples in 200 mL screw capped bottles are heated for 1, 2, and 16 hours at 100 °C. The starches are dried overnight at 40 °C after HMT.

6) Characterization of the modified cassava flour:

- Granule morphology is observed under SEM

- Water absorption index (WAI) is calculated.

- Pasting properties is determined by a Rapid Visco Analyzer (RVA).

- Thermal properties will be evaluated by DSC.

**Example 2:**

If your topic is "The role of Mass Media in Educational Development in Nigeria from 2010-2015," your study's scope will cover all of the media's functions during that time period. Along with the locations and sample size used, it should list the types of mass media that were used to analyze the study. The study's focus is only on how mass media influenced educational growth between 2010 and 2015. The range of mass media tools used included televisions, radios, and other electronic devices that are designed to disseminate information objectively by effectively educating the underprivileged masses. A significant case study was NTA 6 Enugu and the educational programs they broadcast. The intended audience dutifully completed and returned 300 questionnaires to gather some data. You can list any additional restrictions or limitations under the study's limitations.

1. **References**

Follow KMUTT’S thesis writing format. (Please visit <https://regis.kmutt.ac.th/web/formthesis/> to download the KMUTT Thesis/Dissertation Preparation Manual.)

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Candidate’s signature ………………………………

Date …………………………………………………

**Approved by**

……………………………… Advisor Date ……………………

( ……………………………………..)

……………………………… Head of Division Date ……………………

( ……………………………………..)

……………………………… Dean Date ……………………

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