CENTRAL TEACHING INNOVATION FUND

FINAL REPORT

ENGAGING STUDENTS IN STATISTICS: A CREATIVE TEACHING TOOLKIT USING CHACHA CHOCOLATES

ABDULLAH MUZI MARPAUNG,
23120736

Academic Development Center

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Swiss German University
The Prominence Tower Alam Sutera
Jalan Jalur Sutera Barat no.15
Tangerang, Banten 15143

Tel. +62 21 2977 9596/9597
Fax. +62 21 2977 9598
marketing@sgu.ac.id
www.sgu.ac.id

A. Title Page

Title of Proposal	:	Engaging Students in Statistics: A Creative Teaching Toolkit Using CHACHA Chocolates
Name of Course	:	General Statistics
Representative	:	Abdullah Muzi Marpaung
Email	:	abdullah.muzi@sgu.ac.id
Mobile phone	:	08111876800
Duration of CTIF Program	:	6 month

The Prominence Office Tower, Tangerang

Date: 26 May 2025

Course Representative	Head of Program Study	Dean of Faculty
	Signature 	**Signature** 
Dr. Ir. Abdullah Muzi Marpaung	**Della Rahmawati, S.Si, M.Si, PhD**	**Dr. Hery Sutanto, S.Si., M.Si.**
23120736	**11121550**	**11110501**

1. PROJECT SUMMARY

The Chacha Project was designed to make statistics more engaging and intuitive for students by using Chacha candies (similar to M&M's) as a learning medium. Students performed real-time, hands-on data collection using Chacha samples, allowing them to explore statistical concepts such as frequency, probability, distribution, descriptive statistics, and hypothesis testing.

This tactile approach helped bridge abstract statistical theory with real-world, visualized data. The project improved student participation, conceptual understanding, and enthusiasm for a subject often perceived as difficult or dry.

2. TEACHING INNOVATION IMPLEMENTATION

2.1 Project Activities

The project was implemented for students from Food Technology Semester 2, Pharmaceutical and Cosmetic Engineering (PCE) Semester 2, and Biomedical Engineering (BE) Semester 4.

Below is the timeline of key activities:

- **19 February 2025:** Students received the Chacha Project data collection template and began working on their projects.
- **19 February – 9 April 2025:** Students continuously updated their Chacha Projects each week, aligned with the statistical topics being taught.
- **9 April 2025:** All students (100%), organized into four groups, successfully submitted their completed Chacha Projects.
- **22 May 2025:** A workshop for lecturers was conducted to share the project and encourage adoption in other subjects.
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2.2 Challenges & Solutions

Challenge:
The lecturer workshop was attended by only a few participants due to scheduling conflicts.

Solution:
As suggested in the other project, a follow-up workshop will be planned during the semester break, when lecturers are more available.

3. OUTCOMES

The Chacha Project increased student engagement and helped simplify statistical concepts through hands-on learning.

Although not all students completed both pre- and post-tests, results showed improvement:

Average score rose from 63.13 to 67.08

Median score increased from 50 to 75

These gains suggest better understanding and concept retention. The activity was monitored through classroom observation, student submissions, and pre/post-test comparisons. Future implementation will improve attendance tracking to ensure more consistent data.

4. BUDGET REALIZATION *(if applicable)*

- Spending was covered using other sources, and the full allocated budget will be returned.

5. SEMESTER LEARNING PLAN

- SLP (Semester Learning Plan) should be attached to the final report
- Find the SLP Template **HERE** **(THIS SLP TEMPLATE IS FOR CTIF REPORT USE ONLY)**

Appendices

Your Gateway to Global Success

SEMESTER LEARNING PLAN
(RENCANA PEMBELAJARAN SEMESTER)
No. Doc: SLP/FT/ G300-1FTLA

ourse Name : General Statistics
ourse Code : G300-1FTLA
redit : 3 SKS/ 4 ECTS
emester : 4
ourse Status : Mandatory
rerequisite/s : -
aculty : Life Sciences & Technology
tudy Program : Food Technology
oncentration : -
egree : Bachelor
nstructor(s) : Abdullah Muzi Marpaung
elivery Mode : Hybrid
earning Method : Blended Learning
otal Activity Time[1] : 135 hours
cheduled Session[2] : 70 hours
ndependent Study : 65 hours

Course Description	This course introduces fundamental statistical concepts and methods tailored for food technologists and scientists. Students will develop the ability to analyze data, understand probability distributions, conduct hypothesis tests, and

[1] 1 credit equals to 45 hours of learning activities (including guided, structured assignment, & independent study) per semester
[2] total sessions x total SKS x 50 minutes

	draw meaningful conclusions relevant to food science applications.
Learning Outcomes	***Graduate Learning Outcomes (CPL) assigned to this course**
	CPL 1: CPL 2: CPL 3:
	***Course Learning Outcomes (CPMK)**
	By the end of the course, students will be able to: 1. Summarize and interpret univariate and bivariate data in food science contexts. 2. Apply probability and probability distributions to real-world scenarios. 3. Perform hypothesis testing and construct confidence intervals for various datasets. 4. Use statistical methods to draw conclusions and make decisions in food technology.
	***Planned Final Ability (Sub-CPMK, if any)**
	Sub-CPMK X: ..... Sub-CPMK X: ..... Sub-CPMK X: .....
References	**Primary Reference:** Navidi W. 2010. Principles of Statistics for Engineers and Scientists. ISBN 978–0–07–337634–9
	Additional Reference: Walpole RE et al. 2013. Essentials of Probability & Statistics for Engineers & Scientists. ISBN 10: 0-321-78373-5. ISBN 13: 978-0-321-78373-8.

Session	Topic/ Subtopics	Learning Outcomes	Assessment Criteria		Student Learning Experiences/Activities	Learning Methods and Modalities	Allocation Time		Learning Materials
			Indicator	Weight (%)			Scheduled (@50 Min)	Independent Study (@Hours)	

1	• Semester lecturing plan, scoring & assessment, Class rules & regulation . • Statistics for food technologists and scientists • Brief history of statistics Summarizing univariate data	CPMK 1	• Clarity in explaining: Why we need to study electrical engineering • Assessment in Google classroom	2%	Explore course overview and expectations; join introduction discussion on the role of statistics	Lecture, Synchronous, Instructor-led Orientation	2	2	GSlides: Course Overview & Role of Statistics, PDF: Syllabus, Video: Why Statistics Matters GSlides: Bivariate Data, Video: Scatterplot Analysis, Quiz 1 (GCR)
2	• Summarizing bivariate data	CPMK 1, CPMK 4, CPMK 5	• Ability to classify different types of carbohydrates based on their structures and properties. • Ability to explain the role of carbohydrates in food processing and their contributions to food structure, properties, and performance.	6%	Analyze bivariate data using scatterplots; complete GCR quiz and interpret real-world examples	Flipped Classroom, In-Video Quiz, Synchronous	4	4	GSlides: Probability Concepts, Video: Basic Probability, In-Video Quiz (Probability Check)

			• Ability to compare and contrast the impact of different carbohydrates on food texture, viscosity, stability, and nutritional properties • Quiz 1 Assessment in G-classroom						
3	Probability	CPMK 1, CPMK 4, CPMK 5	• Ability to classify different types of proteins based on their structures and properties • Ability to explain the role of proteins in food processing and their contributions to food structure, properties, and performance	8%	• Watch probability video; complete in-video quiz; solve basic probability problems •	Flipped Classroom, Guided Practice, Synchronous and Asynchronous	4	4	GSlides: Distributions I (Binomial, Poisson), Video: Binomial Demo, Quiz 2

			• Ability to compare and contrast the impact of different proteins on food texture, viscosity, stability, and nutritional properties • Quiz 2 Assessment in G-classroom						
4	**Commonly Used Distributions** Binomial Distribution Multinomial Distribution Hypergeometric Distribution Poisson Distribution Normal Distribution	CPMK 1, CPMK 4, CPMK 5	• Ability to classify different types of lipids based on their structures and properties • Ability to explain the role of lipids in food processing and their contributions to food structure, properties, and performance • Ability to compare	8%	• Learn about binomial and Poisson distributions through guided slides; apply formulas in practice quiz •	Lecture, GCR Quiz, Group Problem-Solving	4	4	GSlides: Distributions II (Exponential, CLT), Probability Plot Handout PDF, Quiz 2 (continued)

			and contrast the impact of different lipids on food texture, viscosity, stability, and nutritional properties • Quiz 3 Assessment in G classroom						
5	**Commonly Used Distributions** Lognormal Distribution Exponential Distribution Some other Continuous Distribution Probability Plot Central Limit Theorem			8%	• Explore exponential distribution and CLT; participate in a class example; work on interpretation questions •	Flipped Learning, Case Analysis, Asynchronous Discussion	4	4	GSlides: Point Estimation & Confidence Intervals (Large Samples), Worksheet PDF, Quiz 2
6	Estimation Point Estimation Large-Sample Confidence Intervals for a population Confidence Intervals for Proportion	CPMK 1, CPMK 4, CPMK 5	• Ability to explain the role of water in food processing and their contributions to food structure, properties, and performance	8%	• Estimate population parameters; use worksheet to build confidence intervals for large samples •	Lecture, Worksheet Practice, Synchronous	4	4	GSlides: Confidence Intervals (Small Samples), Case Example Video, Quiz 2

			• Ability to compare and contrast the impact of different water levels on food texture, viscosity, and stability • Assessment in • G-classroom Quiz 4						
7	Small Sample Confidence Intervals for a population mean. Confidence intervals for proportions	CPMK 1, CPMK 4, CPMK 5	• Ability to classify different types of colors, flavors, and additives based on their structures and properties • Ability to explain the role of colors, flavors, and additives in food processing and their contributions to food structure,	8%	• Apply small sample inference; discuss case examples; complete assigned questions in groups •	Group Work, Peer Feedback, In-Class Exercise	2	2	Midterm Exam

	Notes: **[Please Add Notes]**		properties, and performance • Ability to compare and contrast the impact of different colors, flavors, and additives on food texture, viscosity, stability, and nutritional properties • Quiz 5 Assessment in G-classroom						
		CPMK 3, CPMK 4, CPMK 5	• Ability to identify different types of prefabricated food materials based on their properties and characteristics	20%	• Complete midterm exam; reflect on learning progress	Written Midterm Exam, Independent Reflection	4	4	GSlides: Tolerance & Prediction Intervals, Review Video

Prepared by:	Reviewed by:	Approved by:
Dr. Abdullah Muzi Marpaung Dr. Maria DPT Gunawanputeri	Dr. Della Rahmawati	Dr. Hery Sutanto, M.Si.
Head of Editorial Team:	Head of Dept of Food Technology.....	Dean of Faculty of LST.....