

secondary metabolites; separation and purification; methods of structure determination.

16.Course Outline

16.1.Learning/Teaching Style

✓ Informational/Supplemental

16.2.Behavioral Objectives

#	Behavioral Objectives
1	อธิบายเคมีชีวภาพสารสังเคราะห์ของเมแทบอลิต์ปฐมภูมิ Learning outcomes : • 1.1.Possessing well-rounded knowledge • 1.2.Possessing in-depth knowledge • 3.1.Being able to think critically • 3.3.Having skills in problem solving • 4.1.Having professional skills Teaching/Development Method : • Lecture • Problem-based instruction Evaluation Method : • Written examination • Homework assessment
2	อธิบายโครงสร้าง สมบัติทางเคมีและชีวภาพ และความสำคัญของสารชีวโมเลกุล: น้ำ โปรตีน ไขมัน คาร์โบไฮเดรต เอนไซม์ Learning outcomes : • 1.1.Possessing well-rounded knowledge • 1.2.Possessing in-depth knowledge • 3.1.Being able to think critically • 3.3.Having skills in problem solving • 4.1.Having professional skills Teaching/Development Method : • Lecture • Problem-based instruction Evaluation Method : • Written examination • Homework assessment
3	อธิบายเคมีและชีวสังเคราะห์ของเมแทบอลิต์ทุติยภูมิ เทคนิคการแยก และการทำให้สารเมแทบอลิต์ ทุติยภูมิบริสุทธิ์ Learning outcomes : • 1.1.Possessing well-rounded knowledge • 1.2.Possessing in-depth knowledge • 3.1.Being able to think critically • 3.3.Having skills in problem solving • 4.1.Having professional skills Teaching/Development Method : • Lecture • Problem-based instruction Evaluation Method : • Written examination • Homework assessment
4	อธิบายวิธีการหาสูตรโครงสร้างและสมบัติของสารเมแทบอลิต์ทุติยภูมิ Learning outcomes : • 1.1.Possessing well-rounded knowledge • 1.2.Possessing in-depth knowledge • 3.1.Being able to think critically • 3.3.Having skills in problem solving • 4.1.Having professional skills Teaching/Development Method : • Lecture • Problem-based instruction Evaluation Method : • Written examination • Homework assessment

Behavioral Objectives Table

รายละเอียด	1	2	3	4	5	6	7	8	9					
	1.1	1.2	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	4.4	4.5	5.1	5.2
1	●	●			●		●	●						
2	●	●			●		●	●						
3	●	●			●		●	●						
4	●	●			●		●	●						

16.3.Content

Week	Description	Student Assignment
1	Introduction, metabolites, applications of biological chemistry in biotechnology Behavioral Objectives : • 1 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • INTHAWOOT	
2	Biological substance: Lipids Behavioral Objectives : • 2 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • INTHAWOOT	
3-5	Biological substance: Water, Amino acids, Proteins, Carbohydrates	

	Behavioral Objectives : • 2 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • THANACHAN	
6	Biological substance: Enzymes Behavioral Objectives : • 2 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • NATTIDA	
7	Chemistry and biosynthesis of secondary metabolites: Antibiotics and Vaccines Behavioral Objectives : • 3 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • CHANPRAPA	
8-11	Chemistry and biosynthesis of secondary metabolites: Hormones and Stimulants, Toxins Behavioral Objectives : • 3 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • KITIPONG	
11-12	Separation, purification and analytical techniques: Electrophoresis Behavioral Objectives : • 4 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • CHANPRAPA	
12-13	Separation, purification and analytical techniques: Bioassay Behavioral Objectives : • 4 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • CHEUNJIT	
13-14	Separation, purification and analytical techniques: High Performance Liquid Chromatography (HPLC) Behavioral Objectives : • 4 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • SIRIMA	
14-15	Separation, purification and analytical techniques: Thin Layer Chromatography (TLC) and Gas Chromatography (GC) Behavioral Objectives : • 4 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • INTHAWOOT	
16	Structural determination Behavioral Objectives : • 4 Outcome : • 1.1 • 1.2 • 3.1 • 3.3 • 4.1 Instructor : • Panita	

16.4. Teaching Media

✓ เฝ้ายบนกระดาน

✓ สื่อนำเสนอในรูปแบบ Powerpoint media

16.5. Communication with students through social networks

16.5.1. Form and Usage: ✓ ไลน์/Email

16.5.2. Learning Management

System ✓ Blackboard

16.6. Students Consultation 2.0 Hour/Week

16.7. Assessment

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Activities Assessed	Percent
Midterm examination	50.00
Final examination	50.00

Assessment Criteria

According to group means and scores.

17. Reading List

17.1. Required Texts

2. Fennema, O.R. . Food Chemistry (3rd ed.). Marcel Dekkar.

17.2. Supplementary Texts

1. Alais, C., and Linded, G. . Food Biochemistry. Ellis Horwood..

3. Page, D.S. . Principles of biological chemistry. Willard Grant Press..

4. Voet, D., Voet, J. G., and Pratt, C. W.. Principles of biochemistry (4th ed.). Wiley.

17.3. Research/Academic Articles (if any)

17.4. Related Electronic Media or Websites

18. Teaching Evaluation

18.1.18.1. Evaluation through the CUCAS – SCE system

18.2. Changes made in accordance with previous teaching evaluation

First time for this course.

19. Remark