Course Syllabus

1. Name of Curriculum Bachelor of Science (Food Science and Technology), Mahidol University International College

2. Course Code ICFS 372 **Course Title** Treatment and Utilization of Water and Wastewater

3. Number of Credits 2 (2-0) (Lecture-Lab)

4. Prerequisites ICBI 211, ICCH 111

5. Type of Course Elective

6. Semester/ Academic Year 2nd trimester/ 2004

7. Course Description

Sources and uses of water, municipal and agricultural water uses; ecological and biological characteristics of water; chemical characteristics of water; biological indicators of rivers and streams; water quality in streams, rivers and estuaries; water quality in lakes and reservoirs; water and wastewater treatment; biological treatment methods.

8. Course Objectives

1. To be able to describe sources and uses of water, municipal and agricultura water uses.
2. To be able to explain ecological and biological characteristics of water as well as the chemical characteristics of water.
3. To be able to explain biological indicators of rivers and streams including water quality in streams, rivers and estuaries, lakes and reservoirs.
4. To understand the physical, biological, and chemical treatment methods of water and wastewater.

9. Course Outline

Week	Title		Instructor
	Lecture	Hour	
1	1. Introduction 1.1 Sources and uses of water 1.2 Municipal water use 1.3 Agricultural water use 1.4 Sources of wastewater	4	Prayad
2	2. Ecological and Biological Characteristics of Water 2.1 Some basic concepts from microbiology 2.2 Microorganisms in water and wastewater 2.3 Enumeration of bacteria 2.4 Estimation of bacterial densities 2.5 The use of *Escherichia coli* as an indicator	4	Prayad

	organisms bioassays		
3	3. Chemical Characteristics of Water : Effects of Inorganic Matter 3.1 Major and minor ionic and nonionic species in water 3.2 Inorganic species and nutrients added by human 3.3 ph versus concentration 3.4 Carbonate equilibrium 3.5 Alkalinity 3.6 Hardness 3.7 Solubility and transfer of gases in water	4	Prayad
4	4. Chemical Characteristics of Water : Effects of Organic Matter 4.1 Natural organic compounds 4.2 Synthetic organic compounds 4.3 Measurements of organic matter 4.4 Theoretical oxygen demand (ThOD) 4.5 Dissolved oxygen and oxygen demand	4	Prayad
5	5. Water Treatment System I 5.1 Softening/Sedimentation 5.2 Coagulation/Flocculation 5.3 Filtration	4	Prayad
6	Midterm Examination	4	Prayad
7	6. Water Treatment System II 6.1 Ion Exchange 6.2 Chlorination 6.3 Disinfection	4	Prayad
8	7. Water and Wastewater Treatment I 7.1 Physical treatment methods 7.2 Chemical treatment methods	4	Prayad
9	8. Biological Wastewater Treatment Methods I 8.1 Activated sludge processes 8.2 Trickling filter processes	4	Prayad
10	9. Biological Wastewater Treatment Methods II 9.1 Oxidation pond processes 9.2 Anaerobic processes	4	Prayad
11	10. Advanced Biological Treatment of Wastes I 10.1 Heavy metal biosorption 10.2 Bioremediation 10.3 Phytoremediation	4	Prayad
12	Final examination		
	Total	**44**	

10. Teaching Methods

Method of teaching consists of lecturing, class exercise, field trip and presentation.

11. Teaching Media

Textbooks, Handouts and LCD projectors.

12. Course Achievement

Students will be evaluated from their total score (out of 100%). Grading system is A, B^+, B, C^+, C and F.

13. Course Evaluation

1. Mid-term examination	40%
2. Final examination	40%
3. Presentation, exercise and reports	20%
Total	100%

14. Reference

TBA

15. Instructors

Associate Professor Dr. Prayad Pokethitiyook

16. Course Coordinators

Associate Professor Dr. Prayad Pokethitiyook