Course Syllabus

1. **Name of Curriculum** Bachelor of Science Program in Environment
   Faculty/Institute/College Mahidol University International College, Faculty of Science, Faculty of Environment and Resource Studies, Mahidol University
2. **Course Code** ICEN 464 **Course Title** Water Resources Management
3. **Number of Credits** 4 **(Lecture/Lab)** (4-0)
4. **Prerequisite** None
5. **Type of Course** Elective
6. **Trimester / Academic Year**
   First / 2005
7. **Course Description**
   Understanding of the processes in hydrologic cycle that includes measurement, computation, estimation and determination in each area. Water resources problems, the conception, planning and design of functional elements and facilities to control and utilize water, basic to all water management.
8. **Course Objectives**
   a. To learn how to analyse and comprehend basic principle of water resources and its planning and management
   b. To visualise systematic process on environmentally water resource management and sustainable water resource development
   c. To launch the skilful techniques on application of IT for water resource planning and management
9. **Course Outline**

Week	Topic				Instructor
	Lecture/Seminar	Hour	Lab	Hour	
1	**Introduction to water resources** - historical profile on world water resources development - water resources and humanities - development of water science - global water resources - hydrologic cycle - watershed, zoning, - watershed management, - interrelation of water resources with other natural resources and the environment - concept of sustainable water resources development	4	-		Kampanad Bhaktikul
2	**Problems to water resources in the new millennium** - water quality and water	4	-		Kampanad Bhaktikul

	pollution - water quantity and water budget - system thinking to water resource management				
3	**Management of water resources** - why management? - what about to be managed? - how to manage? - concept of environmental water management - Concept of Integrated Water Resources Management (IWRM) - water allocation and water scheduling problem - equitable manners of water management	4	-		Kampanad Bhaktikul
4-6	**Basic Techniques for Water Analyses** - rainfall analysis - soil water content analysis - evaporation, transpiration and evapotranspiration - flood measurement - flood frequency analysis - runoff analysis - rainfall-runoff analysis - design of flood peak, - rational formula, - Snyder's method - reservoir operation study - energy generation of hydropower - sediment analysis	12	-		Kampanad Bhaktikul
7	**Water balance study** - water demand and uses - water supply	4	-		Kampanad Bhaktikul
8	**Irrigation water requirement** - principle of irrigation - evapotranspiration - crop coefficient - potential evapotranspiration - effective rainfall,	4	-		Kampanad Bhaktikul
9	**Environmental discourse on dam construction** - concept of EIA study to water resource development	4	-		Kampanad Bhaktikul
10	**Planning and Design of Distribution System**	4	-		Kampanad Bhaktikul

	- water resource planning - planning concept: preliminary study, feasibility study, detailed planning - water duty - canal design				
11	**Global Efforts** - Think Globally: Act Locally on water resources - Manware on water resource management Local water organisations; WUGs, WUAs, - World water organisations; UN, GWP, WWC, etc.	4	-		Kampanad Bhaktikul
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10. Teaching Method

1. Lecture
2. Practical Excercises
3. Discussion
4. Quiz
5. Self-Study

11. Teaching Media

1. Texts and Teaching Materials
2. Transparencies
3. Power Point Presentation

12. Course Achievement

Assessment made from the set-forward criteria. Student who gets 85% up, will have Grade A.

13. Course Evaluation

1. Exercises 10%
2. Oral Presentation 10%
3. midterm Examination 40%
4. Final Examination 40%

14. References

1. Allen, G. R., Pereira, L.S., Raes, D., and Smith, M. (1998). "Crop evapotranspiration", Guidelines for computing crop water requirements. FAO, Irrigation and Drainage paper 56.
2. Bhaktikul, K. (1996). Hydrology for Environmentalist. Course lecture-note. Faculty of Environment and Resource Studies Mahidol University. (in Thai)
3. Bhaktikul, K. (2001). "The Development of a Genetic Algorithm for Real Time Water Allocation and Water Scheduling in Complex Irrigation Systems". PhD Thesis, School of Civil and Environmental Engineering, The University of Edinburgh, UK.
4. Israelsen, O.W., and Hansen,V.E. (1962). *Irrigation Principles and Practices*, John Wiley and Sons Inc., USA.
5. Mays, L.W. (1996). Water resources handbook, McGraw-Hill.

6. Linsley, R.K., Franzini, J.B. (1979) Water-resource engineering, third edition, McGraw-Hill.
7. Taesombat, W.(1988). Applied Hydrology. Department of Irrigation Engineering, Faculty of Engineering, Kasetsart University. (in Thai).
8. Wardlaw, R.W. and Bhaktikul, K. (2004). "Application of Genetic Algorithms for Irrigation Water Scheduling". *Paper accepted to Irrigation and Drainage, 53(1-18). Published online in* http://www.interscience.wiley.com
9. Wardlaw, R.B., and Bhaktikul, K.(2001). "Application of a genetic algorithms for water allocation in an irrigation system. J. Irrigation and Drainage. ICID, CIID.

15. Instructor

Asst.Prof. Dr. Kampanad Bhaktikul

16. Course Coordinator

Asst.Prof. Dr. Kampanad Bhaktikul