

## **Subject : Advanced Hydrology**

Course number : DMP380E

Instructor : Prof. A. W. Jayawardena

Term / Time : Fall through Winter

### 1 Course Description

The objective of this course is to provide knowledge and skill in advanced techniques of hydrological data analysis, modeling and prediction.

### 2 Course Outline (Course Topics)

#### Week

- 1 : Hydrological modelling – basic concepts and approaches
- 2 : Systems theory approach I – Linear theory; Time domain analysis; Frequency domain analysis
- 3 : Systems theory approach II – Non-linear systems, multi-linear systems
- 4 : Instantaneous Unit Hydrograph (IUH)
- 5 : Conceptual models of IUH
- 6 : Synthetic Unit Hydrograph
- 7 : Rainfall-runoff modelling I – Conceptual type
- 8 : Rainfall-runoff modelling II – Physics-based type
- 9 : Introduction to Hydroinformatics
- 10 : Flood routing – Muskingam method; Muskingam-Cunge method
- 11 : Kalman Filtering
- 12 : Frequency analysis
- 13 : Parameter estimation
- 14 : Errors in frequency analysis
- 15 : Examination

### 3 Grading

60% by examination; 40% by in-course assessment

### 4 Textbooks

#### 4-1 Required

#### 4-2 Others

#### **Reference books**

- Battan, L. J. (1984) : Fundamentals of meteorology, Prentice Hall Inc. Englewood Cliffs, New Jersey
- Eagleson, P. S: (1970) : Dynamic hydrology, McGraw Hill Book Co.
- Kite, G. W. (1977): Frequency and risk analysis in hydrology, Water resources publication, Fort Collins, Colorado.
- Lattermann, A. (1991) : System-Theoretical modelling in surface water hydrology, Springer- Verlag.
- McCuen, R. M. ((1989) Hydrologic analysis and design, Prentice Hall
- Raudkivi, R. J. (1979) : Hydrology - An advanced introduction to hydrological processing and modelling, Pergamon Press
- Viessman, W. Lewis, G. L. and Knapp, J. W. (1989): Introduction to hydrology, 3rd Edition, Harper & Row.
- Wanielista, M. (1990) : Hydrology and water quality control, John Wiley
- Course Lecture Notes