

## **Subject: Hydrology**

Course number : DMP2800E

Instructor : Prof. Toshio KOIKE

Term / Time : Fall through Winter

### 1 Course Description

Water is a key which makes a bridge between the socio benefit areas including agriculture and forestry, health, energy and human settlement and the geophysical and bio-geochemical water cycle processes in atmosphere, land and oceans. To establish a physical basis on water cycle, this course aims to introduce important roles of water in climatological and meteorological processes and the basic concepts of hydrology including understanding, observing and modeling of hydrologic processes. Remote sensing and statistic and stochastic approaches are introduced as advanced facets of hydrology.

### 2 Course Outline (Course Topics)

#### (1) Climate System and Water Cycle

- 1) Water properties and their roles in climate system
- 2) Characteristics of moist air and precipitation
- 3) Global energy and water cycle

#### (2) Hydrological Processes, In-situ Observations and Modeling

- 1) River basin hydrological processes
- 2) Atmosphere-land interaction
- 3) Soil moisture and ground water
- 4) Runoff
- 5) River basin hydrological modelling

#### (3) Remote Sensing of Hydrology

- 1) Electromagnetic theory as a basis of remote sensing
- 2) Ground-based remote sensing - *radar*
- 3) Space-based remote sensing – *satellite*

#### (4) Water Resources Planning and Management

- 1) Frequency and time series analysis
- 2) Cost-benefit analysis and optimization
- 3) Climate change impact assessment and adaptation

### 3 Grading

Active participation(25%), Short Reports(25%), Final Examination(50%)

### 4 Reference

- (1) Roland B.Stull: An Introduction to Boundary Layer Meteorology, KLUWER ACADEMIC PUBLISHERS.
- (2) J.R.Holton: An Introduction to Dynamic Meteorology, Academic Press.
- (3) Dingman, R.: Physical Hydrology, Prentice-Hall, Inc.