

**Asian Institute of Technology**  
School of Environment, Resources and Development (SERD) and  
School of Engineering and Technology (SET)  
**Disaster Preparedness, Mitigation and Management (DPMM)**

**IN84.12 Floods and Droughts 3(3-0)**

**Semester: August**

**Course Objective:**

Floods and droughts are one of the most destructive natural phenomena in Asia and around the world. They can cause serious damage to life, properties, public utilities and infrastructures. They hamper social and economic growth of many countries. The objective of this course is to provide knowledge on hydrology of floods and droughts; understanding of their causes, frequencies and magnitudes; modeling of floods and droughts; effective management and mitigation measures of floods and droughts.

**Learning Outcomes:**

On completion of this course, the students will be able to:

- Identify and solve problems relating to hydrology of floods and droughts and analyze their characteristics
- Apply models of floods and droughts
- Design forecasting and warning systems
- Assess impacts of floods and droughts
- Identify and apply floods and droughts mitigation measures to manage associated risks

**Prerequisite:** None

**Course Outline:**

**I. Introduction and Overview**

1. Hydrologic cycle and processes
2. Hydrologic measurements
3. Extreme events
4. Forecasting and warning
5. Impact and mitigation

**II. Hydrology of Floods and Droughts**

1. Estimation techniques
2. Flood characteristics and their distributions
3. Drought characteristics and their distributions
4. Modeling of floods and droughts

**III. Forecasting and Warning Systems**

1. Overview of forecasting models
2. Equipments for forecasting
3. Flood and drought warning
4. Warning procedure and dissemination

**IV. Impacts and Assessment of Floods and Droughts**

1. Impacts: physical, socio-economic and environmental
2. Assessment tools and techniques
3. Vulnerability and capacity assessment
4. Stakeholder participation

## **V. Floods and Mitigation**

1. Mitigation measures
2. Preparedness, readiness, emergency response and rehabilitation
3. Flood damages
4. Institutional arrangement
5. Collaboration and coordination

## **VI. Droughts and Mitigation**

1. Mitigation and adaptation measures
2. Drought damages
3. Drought management
4. Water management schemes to cope with drought
5. Institutional arrangement
6. Collaboration and coordination

## **VII. Risk Assessment and Management of Floods and Droughts**

1. Hazard, vulnerability and risk
2. Risk assessment methods
3. Risk management
4. Preparedness and mitigation

**Laboratory Session(s):** None

### **Learning Resources:**

**Textbooks:** No designated textbook, but class notes and reading materials will be provided.

### **Reference Books:**

1. Asian Productivity Organization (2000), Environmental Impact Assessment for Farms. Report. APO study meeting on adoption of environmental impact assessment (EIA) methods for on-farm level application in Asia and Pacific, Tokyo.
2. Bidinger, F. R., & Johansen, C. (Eds.) (1988), Drought Research Priorities for The Dry Land Tropics, International Crops Research Institute for the Semi-Arid Tropics.
3. Linda Courtenay Botterill and Geoff Cockfield (Eds.) (2012), Drought Risk Management and Policy: Decision Making Under Uncertainty, CRC Press, Taylors and Francis Group, Florida, U.S.A.
4. Robert Coenraads (2006), Natural Disasters and How We Cope, Rowville, Vic.: Five Mile Press, Australia.

### **Journals and Magazines:**

1. Agricultural Water Management Journal, Elsevier
2. Journal of Hydrology, Elsevier
3. Journal of Hydrological Processes, John Wiley and Sons
4. Journal of Water Resources Planning and Management, American Society of Civil Engineers
5. Journal of Hydraulic Research, Taylors and Francis
6. Water Resources Research, American Geophysical Union

### **Others:**

1. ESCAP (1991), Manual and Guidelines for Comprehensive Flood Loss Prevention and Management, United Nations, No. ST/ESCAP/933, Bangkok, Thailand.
2. Glenn J. Hoffman, Terry A Howell and Kenneth H. Solomon, (1990), Management of Farm Irrigation Systems (Monograph), Chapter 21, ASAE.
3. New South Wales Government (1986), Flood Plain Development Manual, New South Wales, Sydney, Australia.

4. Philippine Council for Agriculture, Forestry and Natural Resources Development (2001). El Nino Southern Oscillation: Mitigating Measure. Department of Science and Technology, PCARRD-DOST, Los Banos, Laguna, Philippines.
5. World Meteorological Organization, WMO. (2004): Water and Disasters: Be informed and be prepared. Geneva, Switzerland. WMO-Report No. 971.
6. World Meteorological Organization, WMO (1985): Hydrological Aspects of Drought, UNESCO. Paris, France.
7. Tawatchai Tingsanchali (1996): Floods and Human Interaction, Professorial Inaugural Lecture, Asian Institute of Technology, Bangkok, Thailand

**Teaching and Learning Methods:**

Lectures, Assignments and Presentations

**Time Distribution and Study Load:**

- Lectures: 45 hours
- Self-study: 126 hours
- Assignments, presentations and group activities: 9 hours

**Evaluation Scheme:**

Case study assignments with presentation: 10%

Mid-Semester exam: 40%

Final exam: 50%

Both Mid-semester and Final examinations will be open book.

An "A" would be awarded if a student can excellently elaborate the knowledge learned in class and from other sources of knowledge such as journal articles or reports, by giving his/her own analysis and answer in exams and in case study assignments conducted in this course. "B" would be awarded if a student shows an average understanding of all given topics; "C" would be given if a student meets below average expectation on knowledge acquired and analysis. "D" would be given if a student does not meet basis expectations in understanding and analyzing the topics and issues presented in the course.

**Instructor(s):** Prof. Tawatchai Tingsanchali