| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DC | NCEC525 | Hydroclimatology for Water Resources Management | 3 | 1 | 0 | 4 |

| **Course Objective** |
|---|
| The course aims to impart an understanding of the hydroclimatic challenges and techniques to analyze them. |
| **Learning Outcomes** |
| Upon successful completion of this course, the students should be able to:<br>● understand the connections between hydrology and climate<br>● Interpret and develop basic hydroclimatic models<br>● understand the contemporary issues related to climate change |

| Unit | Topics to be Covered | Contact Hours | Learning Outcome |
|---|---|---|---|
| 1 | **Introduction to Hydroclimatology:** Hydrology and climate connection: temporal and spatial scales, teleconnections, atmospheric and terrestrial measurements | 7L + 1T | To understand the temporal and spatial connections between hydrology and climate |
| 2 | **Hydroclimatic data and models:** Types of hydroclimatic data products, Exploratory data analysis and visualization, types of hydroclimatic models | 7L + 5 T | To know about handling hydroclimatic data products and models |
| 3 | **Statistical modelling:** Concepts, predictors, introduction to common statistical methods, Time series modeling | 12L + 2T | To develop and evaluate statistical hydroclimatic models including time series models |
| 4 | **ML based modeling:** Introduction to ML approaches, implementation through open-source programming platforms | 6L + 4T | To learn the basics of ML approaches in hydroclimatic modeling |
| 5 | **Dynamical modelling:** concepts, GCMs, downscaling, bias correction, RCMs | 7L + 1T | To know the basis of dynamic models and learn to handle GCM products |
| 6 | **Recent advances in hydroclimatic studies** | 3L + 1T | To know about the contemporary global issues related to climate change and its impact on water resources |
| | **Total Contact Hours** | **42L + 14T** | |

**Text Books:**


1. Raju, K. S., & Kumar, N.D. (2018). Impact of Climate Change on Water Resources.
2. Karamouz, M., Nazif, S., and Falahi, M. (2012). Hydrology and hydroclimatology: principles and applications. CRC Press.
3. Maity, R. (2018). Statistical methods in hydrology and hydroclimatology (Vol. 585). Springer.


**Reference Books:**


1. Wilks, D. S. (2011). Statistical methods in the atmospheric sciences (Vol. 100). Academic press.
2. Shelton, M. L. (2009). Hydroclimatology: perspectives and applications. Cambridge University Press.