



GEOG394 Rivers and Runoff



COURSE DELIVERY

Lectures

Two 1 hour lectures per week
(In person & online)

Practicals

Get hands-on in-river
experience measuring water
volumes using different
techniques.

Four 3-hour practicals

(two streams available)

This paper forms an introduction to the hydrological cycle and the movement of water. Classes are designed to outline the core issues of contemporary surface water hydrology, as well outline appropriate techniques and limitations to measuring water resources. The course emphasises practical and hands-on experience with real hydrological data and an opportunity to observe and measure hydrological variables.

Course content modules:

1

CATCHMENT WATER BALANCE AND FLUXES

How water moves
through landscapes,
from rainfall to rivers.

2

FLOW RECORDS & HYDROGRAPHS

Making sense of river
flow data using
hydrographs and
statistics

3

FLOW MECHANICS AND CHANNEL HYDRAULICS

Why water flows the
way it does in real river
channels

4

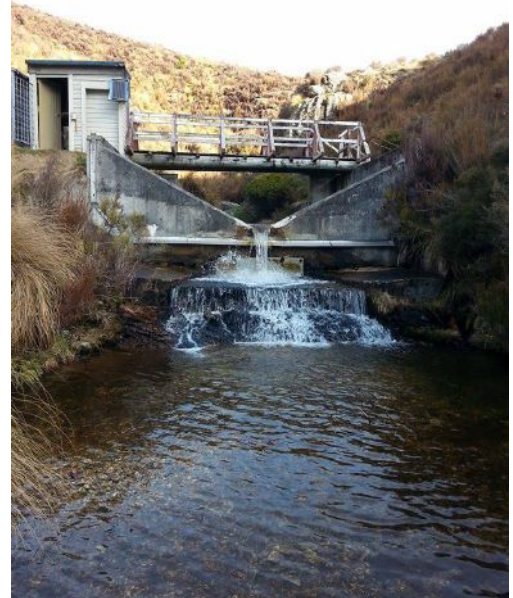
SEDIMENT DYNAMICS AND SYSTEM ADJUSTMENT

How rivers shape and
reshape landscapes
over time

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Fresh water is a globally finite resource that is increasingly under pressure due to over allocation and a changing intensity of the hydrological cycle.

The lecture programme includes the properties of water, atmospheric processes, precipitation measurement, evaporation and transpiration, river behaviour, discharge measurement, and practical applications of hydrological understanding. Classes are designed to outline the core issues of contemporary surface water hydrology, as well outline appropriate techniques and limitations to measuring water resources. The course emphasises practical and hands-on experience with real hydrological data and an opportunity to observe and measure hydrological variables.



Assessment

Assessment is 50% internal (on-going during the semester) and 50% external (final examination)

Course Outcomes

In this course you will:

1. Acquire an understanding of the hydrological cycle
2. Understand the principles behind different field techniques
3. Learn how to measure streamflow and decide which method is suitable for different conditions
4. Apply theoretical understanding to real scenarios.

Study towards jobs in Water Resource Management & Hydrology

Geog288 is designed to introduce you to the core skills used every day by water resource managers and professional hydrologists, both in New Zealand and abroad! Hydrology is a highly valued industry job with employment opportunities in local and central government, consultancies and engineering firms, NGOs, and the agriculture sector.

The course is delivered by Dr Sarah Mager, a member of the executive board of the New Zealand Hydrological Society, with specialist research interests in surface water quality and quantity.



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Course Reading

Readings are set for each lecture and for the laboratory exercises. Recommended Readings from:

- Davie, T., and Quinn, N. 2019. Fundamentals of Hydrology. 3rd Edition. Routledge.
- Dingman, S.L. 2009. Fluvial Hydraulics. 1st Edition, Oxford University Press.
- Herschy, R.W. 2009. Streamflow Measurement. 3rd Edition, Taylor & Francis.
- Knighton, D. 1998. Fluvial forms and Processes: a new perspective. 2nd Edition. Hodder.
- Wohl, E. 2019. Rivers in the landscape. 2nd Edition. Wiley.



Lecture Programme

Module 1 – Catchment Water Balance and Fluxes

1. Introduction & the Catchment Water Balance
2. Precipitation: Processes, Measurement, and Bias
3. Soil Water and the Vadose Zone
4. Infiltration and Runoff Generation
5. Groundwater Storage and Connectivity to Rivers
6. Evaporation and Evapotranspiration

Module 2 – Flow Records, Hydrographs, and Statistical Hydrology

7. Discharge Measurement and Rating Curves
8. Water Balance Applications and Catchment Comparison
9. Hydrographic Analysis I: Event-Scale Behaviour
10. Hydrographic Analysis II: Statistical Description of Flow Regimes
11. Time Series Analysis and Trend Detection in Streamflow
12. Monitoring Networks and Detecting Hydrological Change

Module 3 – Flow Mechanics and Channel Hydraulics

13. Natural Rivers and River Corridors
14. Velocity Theory and Measurement
15. Hydrodynamics: Forces, Flow, and Energy
16. Flow Resistance and Hydraulic Applications

Module 4 – Sediment Dynamics and System Adjustment

17. Erosion and Sedimentation in Fluvial Systems
18. Channel Forms and Bedload Transport
19. Sediment Budgets, Yields, and Measurement
20. Trajectories of Change in River Systems
21. Integrated Catchment Behaviour