

**DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **33** **P.G. Diploma/M.Tech. (Surface Water Hydrology)**
 Department: **HY** **Hydrology**
 Year: **I**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|-----------------------------|--------------|---|--------------|---------|--------------------|---|-----|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Semester- I (Autumn) | | | | | | | | | | | | | | |
| 1. | HY-516 | Channel and fluvial hydraulics | PCC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-526 | Deterministic hydrology | PCC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 3. | | Programme Elective Course -I | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 4. | | Programme Elective Course -II | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 5. | | Programme Elective Course -III | PEC | 2/4* | - | - | - | - | - | - | - | - | - | - |
| | | Total | | 18/20 | 6 | 2 | 1 | | | | | | | |
| Semester-II (Spring) | | | | | | | | | | | | | | |
| 1. | HY-522 | Stochastic hydrology | PCC | 4 | 3 | 1 | - | 3 | - | 25 | 0 | 25 | 50 | 0 |
| 2. | HY-523 | Surface water modeling and simulation | PCC | 4 | 2 | 1 | 2 | 2 | - | 10 | 15 | 25 | 50 | 0 |
| 3. | HY-532 | Environmental planning and assessment of projects | PCC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 4. | HY-700 | Seminar | SEM | 2 | - | - | - | - | - | - | - | - | 100 | - |
| 5. | | Programme Elective Course -I | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 6. | | Programme Elective Course -II | PEC | 4/2* | - | - | - | - | - | - | - | - | - | - |
| | | Total | | 22/20 | 8 | 3 | 2 | | | | | | | |

*Credit requirement for PG Diploma/ 1st year M.Tech is 40 credits. Only one 2 credit elective course is permitted in any of the semesters.

**DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **33** **P.G. Diploma/M.Tech. (Surface Water Hydrology)**
 Department: **HY** **Hydrology**
 Year: **II**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|--|--------------|---|--------------|---------|--------------------|---|---|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Semester- I (Autumn) | | | | | | | | | | | | | | |
| 1. | HY-701A | Dissertation Stage-I (to be continued next semester) | DIS | 12 | - | - | - | - | - | - | - | - | 100 | - |
| | | Total | | 12 | | | | | | | | | | |
| Note: Students can take 1 or 2 audit courses as advised by the supervisor, if required. | | | | | | | | | | | | | | |
| Semester-II (Spring) | | | | | | | | | | | | | | |
| 1. | HY-701B | Dissertation Stage-II (contd. From III semester) | DIS | 18 | - | - | - | - | - | - | - | - | 100 | - |
| | | Total | | 18 | | | | | | | | | | |

| Summary | | | | |
|------------------------------------|--------------|--------------|-----------|-----------|
| Semester | 1 | 2 | 3 | 4 |
| Semester-wise Total Credits | 18/20 | 22/20 | 12 | 18 |
| Total Credits | 70 | | | |

Program Elective Courses (Surface Water)

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|-----------------|--------------|---|--------------|---------|--------------------|-----|-----|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | HY-540 | Water Resources Economics | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-525 | Water Resources systems | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-512 | Computer Programming | PEC | 2 | 1 | - | 2 | 1 | - | 10 | 15 | 25 | 50 | - |
| 4. | HY-543 | Flood forecasting | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 5. | HY-538 | Hydrological data collection, processing and analysis | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 6. | HY-537 | Remote sensing and GIS applications | PEC | 4 | 3 | 1 | 2 | 3 | - | 10 | 15 | 25 | 50 | - |
| 7. | HY-551 | Physical Hydrology | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 8. | HY-545 | Surface Water quality modeling | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 9. | HY-546 | Hydroinformatics | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 10. | HY-518 | Water resources planning and Management | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 11. | HY-513 | Hydrometeorology and climate change | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 12. | HY-527 | Groundwater hydrology | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 13. | HY-531 | Watershed Behavior and Conservation Practices | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 14. | HY-552 | Numerical methods in hydrology | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 15. | HY-553 | Experimental hydrology | PEC | 2 | - | - | 4 | - | 2 | - | 50 | - | - | 50 |
| 16. | HY-542 | Urban Hydrology | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 17. | HY-554 | Soil and Water Remediation | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 18. | HY-511 | Hydrologic elements and analysis | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 19. | HY-555 | Soft-computing techniques in hydrology | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 20. | HY-556 | Environmental Quality Lab | PEC | 2 | - | - | 4 | - | 2 | - | 50 | - | - | 50 |

**DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **33** **P.G. Diploma/M.Tech. (Ground Water Hydrology)**
 Department: **HY** **Hydrology**
 Year: **I**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|-----------------------------|--------------|--|--------------|---------|--------------------|---|-----|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Semester- I (Autumn) | | | | | | | | | | | | | | |
| 1. | HY-527 | Groundwater hydrology | PCC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-529 | Geophysical investigations | PCC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-535 | Environmental quality | PCC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 4. | | Programme Elective Course -II | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 5. | | Programme Elective Course -III | PEC | 2/4* | - | - | - | - | - | - | - | - | - | - |
| | | Total | | 18/20 | 9 | 3 | 3 | | | | | | | |
| Semester-II (Spring) | | | | | | | | | | | | | | |
| 1. | HY-528 | Groundwater systems analysis | PCC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-560 | Soil and groundwater contamination modelling | PCC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-700 | Seminar | SEM | 2 | - | - | - | - | - | - | - | - | 100 | - |
| 4. | | Programme Elective Course -I | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 5. | | Programme Elective Course -II | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 6. | | Programme Elective Course -III | PEC | 4/2* | - | - | - | - | - | - | - | - | - | - |
| | | Total | | 22/20 | 6 | 2 | 1 | | | | | | | |

* Credit requirement for PG Diploma/ Ist year M.Tech is 40 credits. Only one 2 credit elective course is permitted in any of the semesters.

**DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **33** **P.G. Diploma/M.Tech. (Ground Water Hydrology)**
 Department: **HY** **Hydrology**
 Year: **II**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|--|--------------|---|--------------|---------|--------------------|---|---|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Semester- I (Autumn) | | | | | | | | | | | | | | |
| 1. | HY-701A | Dissertation Stage-I (to be continued next semester) | DIS | 12 | - | - | - | - | - | - | - | - | 100 | - |
| | | Total | | 12 | | | | | | | | | | |
| Note: Students can take 1 or 2 audit courses as advised by the supervisor, if required. | | | | | | | | | | | | | | |
| Semester-II (Spring) | | | | | | | | | | | | | | |
| 1. | HY-701B | Dissertation Stage-II (contd. From III semester) | DIS | 18 | - | - | - | - | - | - | - | - | 100 | - |
| | | Total | | 18 | | | | | | | | | | |

| Summary | | | | |
|------------------------------------|--------------|--------------|-----------|-----------|
| Semester | 1 | 2 | 3 | 4 |
| Semester-wise Total Credits | 18/20 | 22/20 | 12 | 18 |
| Total Credits | 70 | | | |

Program Elective Courses (Ground Water)

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|-----------------|--------------|---|--------------|---------|--------------------|-----|-----|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | HY-514 | Hydrogeology | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-561 | Multi-phase flow through porous media | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-539 | Isotope hydrology | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 4. | HY-544 | Hydrogeology of hard rocks | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 5. | HY-522 | Stochastic hydrology | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 6. | HY-537 | Remote sensing and GIS applications | PEC | 4 | 3 | 1 | 2 | 3 | - | 10 | 15 | 25 | 50 | - |
| 7. | HY-562 | Irrigation and drainage engineering | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 8. | HY-545 | Surface Water quality modeling | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 9. | HY-546 | Hydroinformatics | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 10. | HY-518 | Water resources planning and Management | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 11. | HY-513 | Hydrometeorology and climate change | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 12. | HY-563 | Vadose zone hydrology | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 13. | HY-552 | Numerical methods in hydrology | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 14. | HY-553 | Experimental hydrology | PEC | 2 | - | - | 4 | - | 2 | - | 50 | - | - | 50 |
| 15. | HY-566 | Groundwater protection and regulation | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 16. | HY-554 | Soil and Water Remediation | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 17. | HY-511 | Hydrologic elements and analysis | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 18. | HY-538 | Hydrological data collection, processing and analysis | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 19. | HY-555 | Soft-computing techniques in hydrology | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 20. | HY-556 | Environmental Quality Lab | PEC | 2 | - | - | 4 | - | 2 | - | 50 | - | - | 50 |

**DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **33** **P.G. Diploma/M.Tech. (Watershed Management)**
 Department: **HY** **Hydrology**
 Year: **I**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|-----------------------------|--------------|---|--------------|---------|--------------------|---|-----|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Semester- I (Autumn) | | | | | | | | | | | | | | |
| 1. | HY-511 | Hydrologic elements and analysis | PCC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-531 | Watershed behavior and conservation practices | PCC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-537 | Remote sensing and GIS applications | PCC | 4 | 3 | 1 | 2 | 3 | - | 10 | 15 | 25 | 50 | - |
| 4. | | Programme Elective Course -I | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 5. | | Programme Elective Course -II | PEC | 2/4* | - | - | - | - | - | - | - | - | - | - |
| | | Total | | 18/20 | 9 | 3 | 2 | | | | | | | |
| Semester-II (Spring) | | | | | | | | | | | | | | |
| 1. | HY-571 | Watershed modeling and simulation | PCC | 4 | 2 | 1 | 2 | 2 | - | 10 | 30 | 20 | 40 | - |
| 2. | HY-562 | Irrigation and drainage engineering | PCC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-700 | Seminar | SEM | 2 | - | - | - | - | - | - | - | - | 100 | - |
| 4. | | Programme Elective Course -I | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 5. | | Programme Elective Course -II | PEC | 4 | - | - | - | - | - | - | - | - | - | - |
| 6. | | Programme Elective Course-III | PEC | 4/2* | - | - | - | - | - | - | - | - | - | - |
| | | | | 22/20 | 5 | 2 | 3 | | | | | | | |

* Credit requirement for PG Diploma/ Ist year M.Tech is 40 credits. Only one 2 credit elective course is permitted in any of the semesters.

**DEPARTMENT OF HYDROLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **33** **P.G. Diploma/M.Tech. (Watershed Management)**
 Department: **HY** **Hydrology**
 Year: **II**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|--|--------------|---|--------------|---------|--------------------|---|---|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Semester- I (Autumn) | | | | | | | | | | | | | | |
| 1. | HY-701A | Dissertation Stage-I (to be continued next semester) | DIS | 12 | - | - | - | - | - | - | - | - | 100 | - |
| | | Total | | 12 | | | | | | | | | | |
| Note: Students can take 1 or 2 audit courses as advised by the supervisor, if required. | | | | | | | | | | | | | | |
| Semester-II (Spring) | | | | | | | | | | | | | | |
| 1. | HY-701B | Dissertation Stage-II (contd. From III semester) | DIS | 18 | - | - | - | - | - | - | - | - | 100 | - |
| | | Total | | 18 | | | | | | | | | | |

| Summary | | | | |
|------------------------------------|--------------|--------------|-----------|-----------|
| Semester | 1 | 2 | 3 | 4 |
| Semester-wise Total Credits | 18/20 | 22/20 | 12 | 18 |
| Total Credits | 70 | | | |

Program Elective Courses (Watershed Management)

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|-----------------|--------------|---|--------------|---------|--------------------|-----|-----|---------------|-----------|---------------------|-----|-----|-----|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | HY-516 | Channel and fluvial hydraulics | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 2. | HY-527 | Groundwater hydrology | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 3. | HY-540 | Water Resources Economics | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 4. | HY-513 | Hydrometeorology and climate change | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 5. | HY-522 | Stochastic hydrology | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 6. | HY-551 | Physical Hydrology | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 7. | HY-545 | Surface Water quality modeling | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 8. | HY-576 | Rural water supply and Sanitation | PEC | 2 | 0 | 0 | - | 2 | - | 25 | - | 25 | 50 | - |
| 9. | HY-526 | Deterministic hydrology | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 10. | HY-530 | Planning and management of watersheds | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 11. | HY-532 | Environmental planning and assessment of projects | PEC | 4 | 3 | 1 | - | 3 | - | 25 | - | 25 | 50 | - |
| 12. | HY-563 | Vadose zone hydrology | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 13. | HY-552 | Numerical methods in hydrology | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 14. | HY-553 | Experimental hydrology | PEC | 2 | - | - | 4 | - | 3 | - | 50 | - | - | 50 |
| 15. | HY-535 | Environmental quality | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 16. | HY-554 | Soil and Water Remediation | PEC | 4 | 3 | 1 | 2/2 | 3 | - | 25 | - | 25 | 50 | - |
| 17. | HY-555 | Soft-computing techniques in hydrology | PEC | 2 | 2 | 1/2 | - | 2 | - | 25 | - | 25 | 50 | - |
| 18. | HY-556 | Environmental Quality Lab | PEC | 2 | - | - | 4 | - | 2 | - | 50 | - | - | 50 |