|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **MODULE DESCRIPTION FORM** |  |   **DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**  **CL987 ENGINEERING HYDROLOGY** | | | |
| **Module Registrar: Dr D G BERTRAM** | **Taught To (Course): Cohorts for whom class is ~~compulsory~~ / optional / ~~elective~~** | | |
| **Other Lecturers Involved:** | **Credit Weighting:** | **Semester:** | |
| **Assumed Prerequisites:** Basic working knowledge of Mathematics, Physical Geography and Physics | **Compulsory/ optional/ elective class** | **Academic Level: 5** | **Suitable for Exchange: Y/~~N~~** |
| **Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Lecture | Tutorial | Laboratory | Groupwork | External | Online | Project | Assignments | Private Study | **Total** | |  |  |  |  |  | 15 | 40 | 25 | 20 | 100 | | | | |
| **Educational Aim** | | | |
| This module aims to:   * Explore the hydrological cycle and the influence of weather, climate and the key processes on the environment * Develop application of hydrological cycle for engineering analysis and design, including:   + Estimating precipitation, including spatial distribution analysis techniques   + Estimating evaporation and evapotranspiration   + Estimating other hydrological losses, including infiltration * Develop skills examining catchments using Engineering Hydrology approaches, including:   + Analysing relationships between precipitation, runoff and storage   + Analysing hydrographs   + Examining the influence of urbanisation and land management practices   + Introducing drainage design techniques and analysis   + Sustainable Urban Drainage systems | | | |
| **Learning Outcomes** | | | |
| On completion of the class the student is expected to be able to    LO1 Outline the significance of the water cycle in the environment, developing appropriate engineering models for the hydrological process and applying the hydrological cycle as a tool in analysing catchments.    LO2 Undertake a range of design and calculation activities based on engineering hydrology, analysing spatially distributed real and synthetic rainfall, surface runoff, base flows and appreciating the underlying relationships and uncertainties.  *(UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)* | | | |
| **Syllabus** | | | |
| The module will teach the following:  Hydrological cycle; homogeneous measurements; records with missing data  Atmospheric water; Water vapour, Precipitation, Evapotranspiration  Hydrologic Measurement of atmospheric water and surface water; rain gauges, calculation of catchment inflow from multiple rain gauges – Theissen polygons, isohyets  Catchment water balance  Catchment Hydrology: Precipitation; evaporation; overland flow; groundwater flow; rainfall and runoff analysis; the Unit Hydrograph; reservoir routing; flood frequency analysis.  Storm Drainage systems and SUDs basic principles | | | |
| **Assessment of Learning Outcomes** | | | |
| For each of the Course Learning Outcomes the following criteria will be used to make judgements on student learning:    LO1 Outline the significance of the water cycle in the environment, developing appropriate engineering models for the hydrological process and applying the hydrological cycle as a tool in analysing catchments.  C1 Detail the underlying principles and individual components of the hydrological cycle  C2 Use catchment and environmental characteristics to determine contributions of hydrological cycle components  C3 Ability to perform catchment water balance analysis techniques  C4 Detail various possible sources of uncertainty in each hydrological process and outline suitable means of addressing each    LO2 Undertake a range of design and calculation activities based on engineering hydrology, analysing spatially distributed real and synthetic rainfall, surface runoff, base flows and appreciating the underlying relationships and uncertainties.  C1 Ability to spatially distribute and convert rain gauge data to estimate inflow to a catchment  C2 The ability to review, adjust and analyse basic hydrological data to convert rainfall to runoff  C3 The ability to solve complex hydrological analyses to determine rainfall-runoff responses  C4 The ability to solve complex model drainage systems involving hydrological processes. | | | |

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

|  |
| --- |
| **Principles of Assessment and Feedback**  *(within Assessment and Feedback Policy at:* [*https://www.strath.ac.uk/staff/policies/academic/*](https://www.strath.ac.uk/staff/policies/academic/)<http://www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/12principles/> *)*  Please state briefly how these are incorporated in this module.   1. All assignments and assessments combine straightforward and challenging tasks. Assessment criteria are set clearly in advance, as are marking rubrics and resources. 2. All assessed coursework assignments are returned to students with feedback including annotations and comments. Model solutions are provided for some coursework assignments. 3. Tutorial problems with answers to encourage and guide private study are provided. These are supported with online learning technology and resources focusing on relevant problem sets..   Opportunity for one-to-one interaction between instructors and students and timely feedback will be made at least every two weeks but is planned on a weekly basis. Online forums and discussion environments will be used and participation encouraged for peer learning on problems. |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Method(s) Including Percentage Breakdown and Duration of Exams** | | | | | | | | |
|  | **Online Assessments** | | | | **Courseworks** | | **Projects** | |
|  | Number | Month(s) | Duration | ***Weighting*** | Number | ***Weighting*** | Number | ***Weighting*** |
|  | various | weekly | various | 25 | 1 | 30 | 1 | 45 |
| L/Outcomes | LO1; LO2 | | | | LO1; | | LO2 | |

*Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.*

|  |
| --- |
| Coursework / Submissions deadlines (*academic weeks*): Mono Lake Project is due Week 9  Rainfall Runoff Project is due at the start of the exam period |
| Resit Assessment Procedures: 3 hr online text examination in August diet & submission of coursework(s) prior to commencement of the August exam diet.  Resit examinations will be held in the resit diet and consist of a resit coursework and online test. Further course work resubmissions at the discretion of the lecturer. |

**PLEASE NOTE:**

**Students must gain a summative mark of 50% pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of test and coursework. No marks from any previous attempts will be transferred to a new resit attempt.**

|  |
| --- |
| **Recommended Reading** |
| **\*\*\*Purchase recommended \*\*Highly recommended reading \*For reference**  Shaw. Hydrology in Practice, 4th Ed. Routledge, Taylor Francis  Wilson, Engineering Hydrology, 4th Ed, Palgrave MacMillan.  Hamil, Understanding Hydraulics, 3rd Ed, Palgrave MacMillan.  Online copies of the above are facilitated via the Library |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Additional Student Feedback**  *(Please specify details of when additional feedback will be provided)*   |  |  |  | | --- | --- | --- | | Date | Time | Room No | | Week 11 | TBC | Online Session |  |  | | --- | | Session: During the online session week 11, feedback on the first coursework, Mono Lake will be provided |   **Approved:** |
| **Course Director Signature: DGBertram** |
| **Date of Last Modifications: Aug 2024** |

(Updated May 2018)

|  |
| --- |
| **MODULE TIMETABLE** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module Code:** | | | **CL987** | | | **Module Title:** | | | | **Engineering Hydrology** | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| **Brief Description of Assessment:**  Assessments include:    Two formal submissions 1. Catchment Water Balance and hydrograph Coursework, ”Mono Lake” (30%) - approximately week 9 (as agreed with tutor)2. Hydrology Analysis Project (40%) – approximately week 14 (as agreed with tutor)   Online quiz assessments and interactive activities 1. One online quiz for each topic of study (7 topics; 10% total mark for quizzes). Students have one attempt at this.2. One online end of course test (10%) covering all topics. Students have one attempt at this.3. One catchment case study blog (10%) **Students need to gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist of online exam & coursework.** | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| **Assessment Timing:-**  Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.  **Please note: Timings can and will change, this should only be used as a guide.** | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| **Semester** | W&D Wk | WK1 | | WK2 | WK3 | | WK4 | WK5 | WK6 | | WK7 | WK8 | WK9 | WK10 | WK11 | Exam Period | |
| **One** | Choose an item.  Choose an item. | Choose an item.  Choose an item. | | Choose an item.  Choose an item. | Choose an item.  Choose an item. | | Choose an item.  Choose an item. | Choose an item.  Choose an item. | Choose an item.  Choose an item. | | Choose an item.  Choose an item. | Choose an item.  Choose an item. | Choose an item.  Choose an item. | Choose an item.  Choose an item. | Choose an item.  Choose an item. | Choose an item. | |
|  | | | | | | | | | | | | | | | | | |
| **Semester** | C&D  Wk | WK1 | | WK2 | WK3 | | WK4 | WK5 | WK6 | | WK7 | WK8 | WK9 | WK10 | WK11 | Exam Period | |
| **Two** | Coursework Set  Project Set | Choose an item.  Choose an item. | | Online Test  Choose an item. | Online Test  Choose an item. | | Online Test  Choose an item. | Online Test  Choose an item. | Online Test  Choose an item. | | Online Test  Choose an item. | Choose an item.  Choose an item. | Coursework Submit  Online Test | Choose an item.  Choose an item. | Choose an item.  Choose an item. | Coursework Submit  Class Test | |
|  | | | | | | | | | | | | | | | | | |