FORMAN CHRISTIAN COLLEGE

**(A Chartered university)**

### Department of Environmental Sciences

**Course code**: ENVR309

**Course title**: Introduction to Environmental Modelling

**Section**: A

**Credit**: 3

**Prerequisite**: none

**Instructor: Dr. Shinho Chung**

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**1) Introduction**

Models and computer simulations are increasingly important in understanding environmental science, in designing solutions to problems in natural resource management and environmental monitoring, and in predicting future environments under changing climates. The emphasis of this course will be on the application and development of models in the context of terrestrial ecosystems.

**2) Learning Objectives**

After completion of this course, students will be able to:

* Utilize different excel functions with absolute/relative reference address
* Utilize excel for making simple models and draw X-Y chart
* Utilize linear regression method to make several environmental models including Standard curve for water analysis, Freundlich Isotherm Model, BOD Model, Wastewater treatment model
* Calculate Air dispersion model and draw charts

**3) Textbook**

* Introduction to environmental modelling, Smith, Jo U., Oxford University Press, 2007.
* Excel resources, <https://support.office.com/>

**4) Grading system**

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity** | **weightage** | **Activity** | **weightage** |
| Midterm exam | 30% | Assignments | 25% |
| Final exam | 30% | Attendance | 15% |

* **Attendance**: Weightage of attendance is 15% out of total mark 100. Minimum 70% of attendance is required to be eligible to attend the final exam. One absence will cause 0.5 point deduction. One late attendance is equal to 1/3 of absence. For example, if you have 4 absences and 5 late attendance, the deduction will be 2.83 (= 0.5 x 4 + 0.5/3 x 5). So, final attendance mark is 12.27 (= 15 – 2.83).
  + Excused leave with following conditions will be regarded as presence: Serious case - illness of student, funeral/hospitalization/wedding of intimate family, funeral of relatives up to 1st cousins. These absences should be informed and supported with proper evidence (prescription, death certificate, wedding photos etc).
  + Informed leave will be regarded as 1/2 presence. Any other less important case with prior notice and/or no submission of evidence of the abovementioned serious case.
* **Assignments:** Excel work sheet will be provided for every topic. By following the instruction in the class, student shall follow it to complete the excel work including calculation, drawing charts and changing each setting. The completed excel sheets need to be submitted to Moodle by the due date given in the table below. Due dates (by 23:59pm) are given in the table below. Weightage of the assignment is 25% of the total 100 marks. 8 assignment takes the same portion of 25%, i.e. 25/8 marks each.
* **Assessment:** Midterm and Final exam will be conducted through Excel. All the assessment will be “Open book/Open note test”. But discussion or getting help from others are not allowed.
* **Plagiarism:** Any student of plagiarism (copy and paste from classmate’s work) will deserve “0” mark for the part plagiarized and will get warning. If two-time plagiarism is found, he/she will get “0” for the assignment/assessment category. If three-times plagiarism is found, he/she will get “F” immediately.

**5) Other Rules**

* **Missing class**

Print handout are given in the beginning of semester and lecture videos of previous semester are uploaded to Moodle server. Students who missed class are asked to watch them to catch up the missing part by themselves. Some specific instruction may not be the same with those in the class. So absent students need to check from classmates.

Other instruction will be sent through Whatsapp/Email/Moodle.

* **Interaction with students**

Forums for question and answer will be provided to raise questions which are not raise in the class due to time limit. On-line interaction with student and instructor will be made through the forum and Whatsapp.

**6) Logistics**

* Key date: Class starts 13 February 2023, Class ends 9 June 2023.   
  Midterm exam on 3 April 2023, Final exam date will be announced later
* Venue: S-320
* Timing: MWF 16:00~16:50pm
* Office hour: Office MWF 9:00~9:50am, Online any time through whatsapp or Moodle forum
* Contact information: instructor’s information given above

**7)  Lesson Plans**

* Video lectures are available in Moodle. Students are asked to download them and study. While watching the video, students need to follow the step-by-step instruction in the video to complete their excel work.

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| --- | --- | --- | --- | --- |
| Week | Day |  | Content | Assignment |
| 1 | 2023-02-13 | M | Introduction of the course |  |
|  | 2023-02-15 | W | Installation of Excel |  |
|  | 2023-02-17 | F | Introduction of Excel |  |
| 2 | 2023-02-20 | M | Entering formula in the cell, Formatting | by next class  (no submission) |
|  | 2023-02-22 | W | Absolute address / relative address |
|  | 2023-02-24 | F | Average, weighted average |
| 3 | 2023-02-27 | M | GPA calculation | by next class  (no submission) |
|  | 2023-03-01 | W | Histogram |
|  | 2023-03-03 | F | Different histogram |
| 4 | 2023-03-06 | M | Drawing chart graph | by next class  (no submission) |
|  | 2023-03-08 | W | Decoration of chart |
|  | 2023-03-10 | F | Options/attributes of chart |
| 5 | 2023-03-13 | M | Population - Age distribution graph | A1. 2023-03-19 |
|  | 2023-03-15 | W | Data importing and Horizontal bar chart |
|  | 2023-03-17 | F | Population - Time series |
| 6 | 2023-03-20 | M | Expression with data dispersion | A2. 2023-03-26 |
|  | 2023-03-22 | W | Showing error bar, Box and whisker plot |
|  | 2023-03-24 | F | Basic statistics |
| 7 | 2023-03-27 | M | Linear Regression | A3. 2023-04-02 |
|  | 2023-03-29 | W | X-Y graph, Phosphorus detection |
|  | 2023-03-31 | F | Quantification of concentration |
| 8 | 2023-04-03 | M | Midterm exam |  |
|  | 2023-04-05 | W | Midterm exam review |  |
|  | 2023-04-07 | F | Easter holiday |  |
| 9 | 2023-04-10 | M |  |
|  | 2023-04-12 | W | Regression with transformed equation | A4. 2023-04-20 |
|  | 2023-04-14 | F | Isotherm adsorption - Freundlich Equation |
| 10 | 2023-04-17 | M | Another Isotherm |
|  | 2023-04-19 | W | BOD concept - Organic material in the water | A5. 2023-05-07 |
|  | 2023-04-21 | F | Spring break |
|  | 2023-04-24 | M |
|  | 2023-04-26 | W |
|  | 2023-04-28 | F | BOD equation |
| 11 | 2023-05-01 | M | Labor's day |
|  | 2023-05-03 | W | Repeated calculation practice |
|  | 2023-05-05 | F | BOD curve modelling - BOD ultimate |
| 12 | 2023-05-08 | M | Air pollution diffusion model - concept | A6. 2023-05-21 |
|  | 2023-05-10 | W | Air diffusion model – calculation |
|  | 2023-05-12 | F | Air diffusion model - drawing chart |
| 13 | 2023-05-15 | M | Air diffusion model - surface chart |
|  | 2023-05-17 | W | Understanding of wastewater treatment flow | A7. 2023-05-28 |
|  | 2023-05-19 | F | Wastewater treatment process - estimation |
| 14 | 2023-05-22 | M | Wastewater treatment - repeated calculation |
|  | 2023-05-24 | W | Wastewater treatment process modeling - final |
|  | 2023-05-26 | F | Process estimation of different input |
| 15 | 2023-05-29 | M | Heat capacity - concept | A.8 2023-06-11 |
|  | 2023-05-31 | W | Heat capacity - multiple regression |
|  | 2023-06-02 | F | Heat capacity - Integration |
| 16 | 2023-06-05 | M | Average Cp for mixed gas |
|  | 2023-06-07 | W | Estimation of combustion temperature |
|  | 2023-06-09 | F | Utilization of automatic calculation |
| 2023-06-12~06-21 | | | Final Exam : The date to be announced later |  |