

## MV0218 Environmental geochemistry, 15 HEC

### Teachers

|                       |       |  |
|-----------------------|-------|--|
| Geert Cornelis        | (GC)  | Department of Soil and Environment           |
| Dan Berggren Kleja    | (DBK) | Department of Soil and Environment           |
| Jon-Petter Gustafsson | (JPG) | Department of Soil and Environment           |
| Carin Sjöstedt        | (CS)  | Department of Soil and Environment           |
| Vadim Kessler         | (VK)  | Department of Chemistry and Biotechnology    |
| Gulaim Seisenbaeva    | (GS)  | Department of Chemistry and Biotechnology    |
| Karin Wiberg          | (KW)  | Department of Aquatic Science and Assessment |
| Anna-Karin Dahlberg   | (AKD) | Department of Aquatic Science and Assessment |
| Lutz Ahrens           | (LA)  | Department of Aquatic Science and Assessment |
| Mark Elert            | (ME)  | Kemakta konsult AB                           |

Course period = 4 Nov 2019 - 20 Jan 2020

**Exercises, labs and the seminar presentations (indicated in bold) are mandatory**

| Date      | Room                          | Time          | Activity  | Teachers |
|-----------|-------------------------------|---------------|---|----------|
| Mon 4/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Course introduction - Introduction to soil chemistry  | GC       |
|           | <b>Lärosal X</b>              | 13.15 – 16.00 | Basic chemical concepts   | VK       |
| Tue 5/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Soil minerals   | VK       |
|           | <b>Lärosal U</b>              | 13.15 – 16.00 | Soil minerals - exercises   |          |
| Wed 6/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Soil minerals   | VK       |
| Thu 7/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Soil minerals - exercises   | VK       |
|           | <b>Lärosal U</b>              | 13.15 – 16.00 | Calculations, Visualization of soil minerals  | VK       |
| Fri 8/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Solution chemistry  | CS       |
|           | <b>Lärosal U</b>              | 13.15 – 16.00 | Solution chemistry  | CS       |
| Mo 11/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Solution chemistry – exercises  | CS       |
|           | <b>Lärosal U</b>              | 13.15 – 16.00 | Solution chemistry  | CS       |
| Tue 12/11 | <b>BioC D-226b D-220</b>      | 09.15 – 12.00 | <b>Lab. 1, Chemical structure of soil minerals,</b><br>X-ray diffraction and scanning electron microscopy | VK,GS    |
|           | <b>BioC D-226b D-220</b>      | 13.15 – 16.00 | <b>Lab. 1, Chemical structure of soil minerals,</b><br>X-ray diffraction and scanning electron microscopy | VK,GS    |
| Wed 13/11 | <b>MVM B2024 (datorsal 2)</b> | 09.15 – 12.00 | <b>Lab. 1, data treatment, writing</b>  | VK,GS    |
| Thu 14/11 | <b>Lärosal U</b>              | 09.15 – 12.00 | Adsorption of anions and cations  | GC       |
|           | <b>Lärosal U</b>              | 13.15 – 16.00 | Adsorption of anions and cations  | GC       |
| Fr 15/11  | <b>Lärosal U</b>              | 09.15 – 12.00 | Adsorption of anions and cations - exercises  | GC       |
|           | <b>Lärosal U</b>              | 13.15 – 16.00 | Adsorption of anions and cations  | GC       |

| Date      | Room                    | Time          | Activity  | Teachers |
|-----------|-------------------------|---------------|---|----------|
| Mo 18/11  | MVM K2/K3               | 09.15 – 12.00 | Lab 2. pH-dependent solubility of lead in a contaminated soil                   | GC,CS    |
|           | MVM K2/K3               | 13.15 – 16.00 | Lab 2. pH-dependent solubility of lead in a contaminated soil                   | GC,CS    |
| Tue 19/11 | MVM K2/K3               | 09.15 – 12.00 | Lab 2. pH-dependent solubility of lead in a contaminated soil                   | GC,CS    |
|           | MVM B2024 (datorsal 2)  | 13.15 – 16.00 | Lab 2. data treatment   | GC,CS    |
| Wed 20/11 | Lärosal T               | 13.15 – 16.00 | Lab 2. data treatment   | GC,CS    |
| Thu 21/11 | Lärosal Y               | 09.15 – 12.00 | Mineral solubility  | JPG      |
|           | Lärosal Y               | 13.15 – 16.00 | Mineral solubility  | JPG      |
| Fri 22/11 | Lärosal Z               | 09.15 – 12.00 | Mineral solubility – exercises  | JPG      |
|           | Lärosal Z               | 13.15 – 16.00 | Mineral solubility  | JPG      |
| Mo 25/11  | MVM B2024 (datorsal 2)  | 09.15 – 12.00 | Geochemical modelling -solution chemistry                                       | JPG      |
|           | MVM B2024 (datorsal 2)  | 13.15 – 16.00 | Geochemical modelling -solution chemistry-independent work (no teacher present) | JPG      |
| Tue 26/11 | Bibliotek Datorsal 1    | 09.15 – 12.00 | Geochemical modelling –cation and anion adsorption                              | JPG      |
|           | Bibliotek Datorsal 1    | 13.15 – 16.00 | Geochemical modelling –cation and anion adsorption                              | JPG      |
| Wed 27/11 | Lärosal X               | 09.15 – 12.00 | Using leaching tests in environmental risk assessments                          | JPG      |
| Thu 28/11 | Lärosal Q               | 09.15 – 12.00 | Soil organic matter – structure and reactivity                                  | DBK      |
|           | Lärosal Q               | 13.15 – 16.00 | Ion exchange  | DBK      |
| Fri 29/11 | Lärosal Q               | 09.15 – 12.00 | Ion exchange-exercises  | DBK      |
|           | Lärosal Q               | 13.15 – 16.00 | Soil acidity  | DBK      |
| Mo 2/12   | Study                   |               |   |          |
| Tue 3/12  | Lärosal Q               | 09.15 – 12.00 | Soil acidity - exercises  | DBK      |
|           | Lärosal Q               | 13.15 – 16.00 | Redox   | DBK      |
| Wed 4/12  | Lärosal Q               | 09.15 – 12.00 | Redox – exercises   | DBK      |
| Thu 5/12  | Lärosal Q               | 09.15 – 12.00 | Redox   | DBK      |
|           | Lärosal Q               | 13.15 – 16.00 | Redox – exercises   | DBK      |
| Fri 6/12  | Study                   |               |   |          |
| Mon 9/12  | Lärosal X               | 09.15 – 12.00 | Environmental chemistry of organic contaminants                                 | KW       |
|           | Lärosal X               | 13.15 – 16.00 | Environmental chemistry of non-polar organic contaminants, fugacity modelling   | AKD      |
| Tue 10/12 | MVM B2024 (datorsal 2)  | 09.15 – 12.00 | Exercise – fugacity modelling   | AKD      |
|           | MVM B2024 (datorsal 2)  | 13.15 – 16.00 | Exercise – fugacity modelling   | AKD      |
| Wed 11/12 | Lärosal X               | 09.15 – 12.00 | Environmental chemistry of PFAS   | LA       |
| Thu 12/12 | MVM B2024 (datorsal 2)  | 09.15 – 12.00 | Exercise - Environmental chemistry of PFAS                                      | LA       |
|           | MVM B2024 (datorsal 2)  | 13.15 – 16.00 | Exercise - Environmental chemistry of PFAS                                      | LA       |
| Fri 13/12 | Biocentrum Lärosal C212 | 09:15 – 12:00 | Geochemical modelling - cation and anion sorption-presentation of results       | JPG      |

| Date      | Room                     | Time        | Activity                                    | Teachers |
|-----------|--------------------------|-------------|---|----------|
| Mon 16/12 | Lärosal X                | 9.15-12.00  | Dealing with contaminated soils             | DBK      |
|           | Lärosal X                | 13.15-16.00 | Dealing with contaminated soils             | DBK      |
| Tue 17/12 | MVM B2024 (datorsal 2)   | 9.15-12.00  | <b>Risk assessment of contaminated soil</b> | ME       |
|           | MVM B2024 (datorsal 2)   | 13.15-16.00 | <b>Risk assessment of contaminated soil</b> | ME       |
| Wed 18/12 | Preparation for seminars |             |   |          |
| Thu 19/12 | Preparation for seminars |             |   |          |
| Fri 20/12 | Preparation for seminars |             |   |          |

| Christmas break |                          |            |  |          |
|-----------------|--------------------------|------------|--|----------|
| Tue 7/1         | Preparation for seminars |            |  |          |
| Wed 8/1         | Preparation for seminars |            |  |          |
| Thu 9/1         | Preparation for seminars |            |  |          |
| Fri 10/1        | Lärosal X                | 9.15-12.00 | <b>Presentation of seminar task</b>                            | DBK, JPG |
| Mon 13/1        | Study                    |            |  |          |
| Tue 14/1        | Lärosal X                | 9.15-12.00 | Participants questions<br>Course evaluation (oral and written) | ALL      |
| Wed 15/1        | Study                    |            |  |          |
| Thu 16/1        | Study                    |            |  |          |
| Fri 17/1        | A2034                    | 9.15-14.15 | <b>Written exam</b>  |          |