



UNIVERSITY OF GOTHENBURG

**Research course in**

## **“Clays: mineralogy, geochemistry and geotechnical properties”**

**11-15 May, 2009**

**Department of Earth Sciences, University of Gothenburg, Sweden**

In cooperation with the “Quick” project (financed by the Swedish Rescue Agency)

This course will give in-depth understanding of many properties that make clay deposits and clay minerals important in nature and society. Emphasis will be given to geotechnical characteristics, which need to be increasingly well specified in connection environmental change and stability risks in both rural and built environments. Glaciomarine deposits are most prone to “quick clay” development, with low remoulded strength, and the problems in southwestern Sweden and western Canada will be illustrated, in part, with an excursion on Friday afternoon, 15 May. Laboratory analyses of selected samples will also be carried out to illustrate both methodology and the relationships between composition, texture and the site-related effects.

The main target group for this course is PhD students within geology, physical geography and environmental science who are interested in the ground conditions and processes. However, if space permits, upper-level graduates can also follow the course as part of the Environmental Geology course (April-May) at the Department of Earth Sciences or as a separate course. Professionals are welcome to apply, and the course fee for non-student is 500 SEK per day.

Principal lecturer: Prof. Kenneth Torrance (Carlton University, Canada), internationally recognized as a leading researcher in clay science for over 40 years.  
Additional lectures, laboratory exercises and excursion: Prof. Rodney Stevens.

A mini-symposium on “*Applied Clay Science*” will be organised on Friday, 15 May, to provide participants and other researchers the opportunity to present their work, hopefully demonstrating the breath and importance of the clay research. This meeting will include an afternoon excursion to several local sites of former “quick clay” landslides and other geotechnical and environmental issues related to the clay deposits.

### **Optional field and laboratory course and special projects**

During the period 18-29 May the participants are offered the chance to apply the theoretical background of this course toward actual site problems. Both field and laboratory activities will be aimed at gaining practical experience. The choice of sites will depend upon the on-going constructional and other investigations near Gothenburg and the specific interests of the participants. It is also possible to make an in-depth literature study that can be presented separately or combined with the field and laboratory activities.

Participation in main course (11-15 May), including background literature readings, provides 2 ECTS. The optional field and laboratory course and literature study will be individually planned, and may typically range from 2-6 additional ECTS. Some financial support for travel and accommodations is available for Nordic students through the Nordic Mineralogical Network (write to Dr. Tonci Balic-Zunic: [Tonci@geo.ku.dk](mailto:Tonci@geo.ku.dk)).

For further information and course registration, please contact Rodney Stevens, +46-31-7862807; email [stevens@gvc.gu.se](mailto:stevens@gvc.gu.se). Deadline for registration is April 1, 2009, but acceptance of qualified applicants is on a first-come basis.

The tentative outline of lectures by Ken Torrance:

1. Introduction
2. Fundamentals of mineral structure
3. Silicate structures
4. Phyllosilicate structures
5. Phyllosilicate minerals in soil
6. Specific clay minerals
7. Oxide minerals
8. Soil minerals – origins and weatherability
9. Surface charge, cation exchange capacity, zero point of charge
10. Double layer theory and implications
11. Clay mineral identification – XRD
12. Bringing it all together – development of sensitivity – geotechnical applications – barriers – etc.