UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF GEOSCIENCE
COURSE OUTLINE
WINTER 2015

1. **Course:** Geology 689.02 (Petroleum Fluids)

   Lecture Sections:

   L01: Th, 15:30-18:20, ES 054
   Instructor, Dr. T. Oldenburg, Office ES 546, Tel. No. 403-220-3260, e-mail address, toldenbu@ucalgary.ca,
   Office Hours: TBA

   Course website or Desire 2 Learn (D2L) GLGY 68902
   Geoscience Department ES 118, 403-220-5841, geoscience.ucalgary.ca, geoscience@ucalgary.ca

2. **Prerequisites:** Geology 449 or Geophysics 449 and Geology 461 or Geophysics 457. See section 3.5.C in the Faculty of Science section of the online Calendar (www.ucalgary.ca/pubs/calendar/current/sc-3-5.html)

   Antirequisite: Credit for both Geology 589 and 689 will not be allowed.

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

   689.02 (Petroleum Fluids): Based on a powerpoint presentation file of a course topic appropriate for a presentation at a conference or an industrial business meeting. (80%). In addition, a proposal for the use of additional petroleum geochemical tools has to be developed for the petroleum exploration and/or production task (20%). Assessment of the overall presentation is for technical content 80% and graphical presentation 20%.

Grading Scale					
A+	A	A-	B+	B	B-
100-96%	95-91%	90-86%	85-81%	80-76%	75-71%
C+	C	C-	D+	D	F
70-66%	65-61%	60-56%	55-51%	50-46%	< 46%

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize himself/herself with these regulations. See also Section E.6 of the University Calendar

5. **Course Materials:**
   A huge selection of course related articles (pfd files) from national and international journals will be provided.
   Important reading supporting texts are:
   Petroleum Geoscience, Jon Gluyas and Richard Swarbrick, Blackwell, 2004, ISBN 0-632-03767-9, 359pp
   The Petroleum System-From Source to Trap, AAPG memoir 60.(1994) Eds. L.Magoon and G. Claypool, 1994.
   Published by AAPG, 1994; 644pp.Parts 1-4 and selected bits of parts 5,6.
   Seals, traps and the petroleum system, AAPG memoir 67. (1997), Ed. R.C.Surdam, 314pp.
   Understanding Petroleum Reservoirs: Towards an Integrated Reservoir Engineering and Geochemical approach, J.M.Cubitt, W.A. England, S.R. Larter, Geological Society Spec. Publ., 237, 2004, 395 pp
   Hunt, J.M.(1984) Petroleum Geochemistry and Geology, Freeman, 617pp
   The Pepper et al trilogy of papers in Marine and Petroleum Geology-supplied as PDFs.
   Plus additional papers selected through the course.

   Additional useful texts
   Cooper, B. (1990) Practical Petroleum Geochemistry, Robertson Scientific Publications, 174pp
   North, F.K. (1985) Petroleum Geology. Unwin, 630pp

OR
Selley, R.C. (1998) Elements of Petroleum Geology. 2nd Edition.
OR
Bjorlykke, K. (1884) Sedimentology and Petroleum Geology, Springer Verlag, 363pp
Introduction to Organic Geochemistry, S. Killops and V. Killops, Blackwell, 2005, ISBN-0-632-06504-4, p393.
The Biomarker Guide (2005) (Volumes 1 and 2) Peters, Walters, Moldowan. Cambridge University Press, New York.

6. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) Misconduct: Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties.

(b) Assembly Points: In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

(c) Academic Accommodation Policy: Students with documentable disabilities are referred to the following links: Students with Disabilities: http://www.ucalgary.ca/pubs/calendar/current/b-1.html B.1 and Student Accessibility Services: http://www.ucalgary.ca/access/.

(d) Safewalk: Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) Freedom of Information and Privacy: This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also http://www.ucalgary.ca/secretariat/privacy.

(f) Student Union Information: VP Academic Phone: 220-3911 Email: suvpaca@ucagary.ca.
SU Faculty Rep. Phone: 220-3913 Email: sciencerep@su.ucalgary.ca; Student Ombudsman

(g) Internet and Electronic Device Information: You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

(h) U.S.R.I.: At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI Surveys.

Department Approval: Original Signed Date: January 12, 2015

Associate Dean's Approval for
Alternate final examination arrangements: Original Signed Date: January 12, 2015

Attachment

Information on lecture and lab outline

Course content 589.02/689.02/589.08/689.08:

1. What is petroleum? Oil viscosity: Methods (one lecture+lab)
2. Petroleum reservoir group (prg) laboratory visit
3. The molecular geochemistry of petroleum (one lecture+lab)
4. Petroleum Systems and Processes (one lecture+lab)
5. Petroleum Alteration: Biodegradation, Gas washing/biogenic gas and Heavy oil (one lecture+lab)
6. Reservoir Geochemistry-inferring petroleum system parameters from analysis of reservoired oil (one lecture+lab)
7. Generation and Primary Migration (one lecture+lab)
8. Fluid flow, migration physics (PVT) and chemistry of secondary migration (one lecture+lab)
9. Selected case studies (two lectures+labs)
10. How to give a talk and write a abstract (Abstract and presentation clinic) (one lecture+lab)
11. Petroleomics – Petroleum Geochemistry for the 21st Century (one lecture+lab)
12. Tesla laboratory visit

Objectives 589.02/689.02/589.08/689.08:

1. students will learn how petroleum is generated
2. mechanisms how petroleum expels from source rock and migrates to a potential reservoir
3. different petroleum alteration processes in the reservoir
4. how to predict secondary migration pathways/distances using geochemical proxy tools
5. how to predict in-reservoir alteration processes such as biodegradation which has strong influence on the petroleum quality (e.g. viscosity increase [decrease in fluid mobility], increase in acidity [corrosion issues])
6. how to distinct source rocks and identify their paleoenvironments using geochemical parameter
7. how to identify the source rock of a reservoir fluid
8. how to identify the charge direction of petroleum into a reservoir
9. how to categorize petroleum fluids from different reservoirs (are they belonging to the same oil family?)
10. how to identify fill-spill routes in a petroleum system
11. geochemical analytical methods
12. how to measure fluid properties of extreme heavy oil/oil sands
13. how to write an excellent scientific abstract
14. how to prepare and to give an excellent scientific presentation