



UNIVERSITY OF MISKOLC

FACULTY OF
EARTH AND ENVIRONMENTAL
SCIENCES AND ENGINEERING

COMPUTER-AIDED WELL LOG ANALYSIS

MS in Petroleum Geoengineering

Semester 1, 2023/24

COURSE COMMUNICATION FOLDER

University of Miskolc
Faculty of Earth and Environmental Sciences and Engineering
Institute of Exploration Geosciences

Course datasheet

Course Title: Computer-aided well log analysis (Optional Courses)	Credits: 4
Type (lec. / sem. / lab. / consult.) and Number of Contact Hours per Week: sem. 2	
Neptun code: MFGFT73012	
Type of Assessment (exam. / pr. mark. / other): pr. mark Conditions for obtaining the signature: attendance at minimum 70 % of the lessons in the semester and successful independent solution of two problems in the classroom by means of a computer and the necessary software. The determination of the practical mark is based on the results of two problem solutions. The weights of the partial achievements are the same: 50% + 50%. Grading scale (% value → grade): 0 – 49 % → 1 (fail), 50 – 64 % → 2 (pass), 65 – 79 % → 3 (satisfactory), 80 – 89 % → 4 (good), 90 – 100 % → 5 (excellent).	
Position in Curriculum (which semester): third	
Pre-requisites (<i>if any</i>): Petrophysics - Well log interpretation (MFGFT720017)	
Course Description:	
Acquired store of learning: <u>Study goals:</u> Introduction to the computer-aided management, visualization, processing and analysis of data coming from well logging operations applied in hydrocarbon exploration. <u>Course content:</u> Essential characteristics of the file formats and data structures applied in well logging. Basics of the Techlog user interface. Creating and managing projects in Techlog. Data import and quality control. Management of the variables. Computation of True Vertical Depth (TVD). Interactive display of data in tables, charts, cross-plots and log views. Application of interactive selection mode. Creation, management and use of zones and markers. Depth shifting and splicing of log curves. Introduction to the workflow of deterministic well log evaluation in Techlog (the Application Workflow Interface). Quick Look Log Analysis. Conventional Log Analysis.	
Competencies to evolve: <ul style="list-style-type: none">• Knowledge of geological and geophysical surveying methods suitable to find oil and natural gas resources.• Knowledge of exploration methods of oil and natural gas resources.• Ability to understand the laws and connections and to apply the acquired knowledge.• Ability to analyze the geological and geophysical conditions of hydrocarbon reservoirs, to prepare exploration and technical operation plans, to perform the exploration work technically and to control that, to prepare and review (final) reports.• Ability to plan the surface and well-logging geophysical investigations, to make and control measurements, to process and evaluate the measurement data, to make geological and geophysical interpretation, to review these operations.	
The 3-5 most important compulsory, or recommended literature (textbook, book) resources:	
<ul style="list-style-type: none">• updated slide decks of the lectures converted in pdf format: http://geofizika.unimiskolc.hu/education.html• Andrew Knight, 2000: Basics of MATLAB and Beyond, CHAPMAN & HALL/CRC Boca Raton London New York Washington, D.C.• Martin H. Trauth, 2006 : MATLAB® Recipes for Earth Sciences, © Springer-Verlag Berlin Heidelberg, Printed in The Netherlands• Hans Petter Langtangen 2004: Python Scripting for Computational Science Third Edition, Springer-Verlag Berlin Heidelberg• William R. Green, 1991 : Exploration with a Computer Geoscience Data Analysis Applications,	

Pergamon Press, ISBN 0-08-040264-X

- Toby Darling, 2005: Well Logging and Formation Evaluation, Gulf Professional Publishing is an imprint of Elsevier 30 Corporate Drive, Suite 400, Burlington, MA 01803, USA Linacre House, Jordan Hill, Oxford OX2 8DP, UK

Responsible Instructor(*name, position, scientific degree*):

Péter Tamás Vass Dr., associate professor (84.6%), Kamal Mohammed Ali Hussein Mattash, PhD student (15.4%)

Syllabus of the semester

Week	Seminar
15/09/2023	Basics of the Techlog user interface. Creating and managing projects in Techlog.
22/09/2023	Data import and quality control.
29/09/2023	Data export and filtering data
06/10/2023	Variable management
13/10/2023	Creating and editing LogView plots.
20/10/2023	Doing exercises for preparing the first independent problem solution.
27/10/2023	The solution of the first problem by using a computer and the necessary software
03/11/2023	No education
10/11/2023	LogView plots , Palettes and Zonation windows.
17/11/2023	Reference management, TVD computation, creation of index dataset, reference track, display of variable data as text.
24/11/2023	Plots and Data editor. Histograms in a layout, cross plots in a layout, single well histogram, single well cross plot, multi well box plots, histogram matrix plot, multi well cross plot
01/12/2023	Application Workflow Interface (AWI), Quick Look Method in the Quanti modul.
08/12/2023	Doing exercises for preparing the second independent problem solution.
15/12/2023	The solution of the second problem by using a computer and the necessary software.

Example of problem to be solved

1. Start Techlog, and create a new project. (3 points)
2. Import the *xxx.las* file into the project. (3 points)
3. Select the right family and unit for each imported variables. (3 points)
4. Create a logview with three tracks, and display the variables in the form of log curves, then save it. (4 points)
5. Create a histogram from the data of gamma ray and save it. (3 points)
6. Create a neutron-density crossplot, and add a color scale adjusted to the gamma ray values to it, then save it. (4 points)

The following aids can be used during the solution of problem:

- a computer with installed Techlog,
- electronic help of Techlog,
- slides of the course provided by the lecturer,
- own exercise book with the notes made in the former lessons.

Time available for the solution: 50 min.

Evaluation of the solution

Maximum points: 20

Acquired points:

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Range	Mark
$0 \leq \text{and} < 10$	1
$10 \leq \text{and} < 13$	2
$13 \leq \text{and} < 16$	3
$16 \leq \text{and} < 18$	4
$18 \leq \text{and} \leq 20$	5

Mark: