UNIVERSITY OF MISKOLC

FACULTY OF
EARTH AND ENVIRONMENTAL
SCIENCES AND ENGINEERING

COMPUTER APPLICATIONS I.

MFKOT710019

MS in Petroleum Engineering

Full time course

COURSE SYLLABUS

University of MIskolc
Faculty of Earth and Environmental Sciences and Engineering
Institute of Mining and Energy

Miskolc, 2023/2024 II. semester

Course description

Course Title: Computer applications I. **Instructor:** Dr. László Kis, senior lecturer **Lecturer:** Dócs Roland, assistant lecturer	**Code:** MFKOT710019 **Responsible department/institute:** DPE/IPNG (OMTSZ/BEI)
	Course Element: Compulsory
Position in curriculum* (which semester): 2(1)	**Pre-requisites (if any): no**
No. of contact hours per week (lecture + seminar): 0+3	**Type of Assessment (examination / practical mark / other): practical mark**
Credits: 3	**Course: full time**

Course description:
During the course, students will develop the necessary skills (in Microsoft Office Word, Excel, PowerPoint) to be able to write scientific papers and thesis in the correct format, to do calculations required during their engineering studies and to present their results in correct manner. In result building a fine foundation in general and advanced computer applications.

Competence to evolve:

knowledge:

T8: Knows the basics of numerical simulation of underground reservoirs.
T11: Familiar with the methods and software of computer design and analysis in the hydrocarbon industry.

ability:

K11: Capable to perform computer design and evaluations for hydrocarbon industry.

attitude

A2: Strive professionally at a high level, independently or in a workgroup to plan and carry out tasks.
A3: Strives to carry out work using a complex approach based on a systematic and process-oriented mindset.
A4: Seeks to achieve research, development and innovation goals during work.
A5: Open to self-cultivation and vocational training for self-improvement.
A6: Dedicated to high quality working and will strive to convey this approach to the staff.

autonomy and responsibility:

Assessment and grading:
Students will be graded by the results of two tests and a PowerPoint presentation at the end of the semester. The presentation will be held on the 13. week at which the student will present his work in front of the class and the lecturer. Also, attendance of minimum of 60% of the classes is required in order to get grade of the subject.

Grading scale:
90-100%: excellent, 80-89%: good, 70-79%: satisfactory, 60-69%: pass, <60%: failed

Compulsory or recommended literature resources:

1. User manual of Microsoft Word.
2. User manual of Microsoft Excel.
3. Mansfield R.: Mastering VBA for Microsoft Office 2016 3rd Edition, Sybex
4. Wverka P.: Office 2016 All-In-One For Dummies 1st Edition, John Wiley & Sons Inc., New Jersey, 2016.

Course structure

Date	Week	Subject
2024.02.15.	1.	Introduction of the syllabus. The basics regarding MS Word.
2024.02.22.	2.	Formatting raw text in Word.
2024.02.29.	3.	How to use the built in reference manager in MS.Word. How to insert table and graph names the correct way. Inserting reference, table of content and list of tables using the built in functions.
2024.03.07.	4.	I. Examination: In formatting text files. using MS.Word. Introduction to MS.Excel
2024.03.14.	5.	Performing simple calculations in MS.Excel. Presented by the calculation method of Helium porosimetry.
2024.03.21.	6.	Performing complex calculations, using functions in MS:Excel. Fitting trendlines on data. Plotting the values of the trend using LINEST function. Calculating compressible fluid permeability.
2024.03.28.	7.	Education break!
2024.04.04.	8.	Education break!
2024.04.11.	9.	II. Examintaion: Calculations using functions made in MS.Excel. How to use data validation tools and cell conditional formatting tools in MS.Excel.
2024.04.18.	10.	The implementation of data tables, performing actions using Data validation. building up calculations using
2024.04.25.	11.	Building Pivot charts and Dashboards in MS.Excel.
2024.05.02.	12.	Introduction to MS.PowerPoint. The tools of building an informative and entertaining presentation. Giving out the assessment.
2024.05.09.	13.	Examination: Presentation in the given subject.
2024.05.16.	14.	The date of revision tests.

Samples of examinations during the subject:

GAs permeabiliy calculation

Time, [hh:mm:ss]	Accumulated weight, [g	DeltaVol, [cm3	Delta Time, [s	Flowrate, [cm3/s	Pressure diff., [bar]	k, [mD]		Constant numbers		
0:00:00	0,00	0,00	0,00	0,00	0,00	0,00		sample length	7,45	cm
0:01:00	8,60	8,60	60,00	0,14	1,20	115,11		diameter of sample	3,74	cm
0:02:00	17,40	8,80	60,00	0,15	1,18	115,83		A	10,99	cm2
0:03:00	26,40	9,00	60,00	0,15	1,09	109,42		Dynamic visc.	1,00	cP
0:04:00	40,00	13,60	60,00	0,23	0,98	148,67				
0:05:00	50,00	10,00	60,00	0,17	0,98	109,31				
0:06:00	60,00	10,00	60,00	0,17	0,98	109,31		kmeasured	109,31	mD
0:07:00	70,00	10,00	60,00	0,17	0,98	109,31				
0:08:00	80,00	10,00	60,00	0,17	0,98	109,31				
0:09:00	90,00	10,00	60,00	0,17	0,98	109,31				
0:10:00	100,00	10,00	60,00	0,17	0,98	109,31				
0:11:00	110,00	10,00	60,00	0,17	0,98	109,31				
0:12:00	120,00	10,00	60,00	0,17	0,98	109,31				
0:13:00	130,00	10,00	60,00	0,17	0,98	109,31				
0:14:00	140,00	10,00	60,00	0,17	0,98	109,31				
0:15:00	150,00	10,00	60,00	0,17	0,98	109,31				

Gas permeability calculation

Core geometry	
d [cm]	3,765
l [cm]	6,968
A [cm^2]	11,1332
Vtotal [cm^3]	77,5761
m(dry) [g]	137,82

Ta [°C]	23,9
Pa [bar]	1,0030
Gage type [bar]	7
Bar to atm conv.	0,9869
Rotameter const.	1,5
cucm/s to l/h	3,6
μN2 [cP]	0,017579
Voltage starts at [V]	1,012

$$k_g = k_\infty * \left[1 + \frac{b}{p_{avg}}\right]$$

$$q_a = -\frac{k_a * A}{\mu * L * P_a} * \left[\frac{P_2^2 - P_1^2}{2}\right]$$

$$k_a = \frac{\mu * L * P_a}{A * \frac{1}{2} * B} \qquad B = \left[\frac{P_1^2 - P_2^2}{q_a}\right]$$

He porosity [%]	32,95

								Re-Calculated	
Qg	qg	Voltage P1	P1	P1^2-Pa^2	1/Pavg	kg	(P1^2-Pa^2)/qg	kg	(P1^2-Pa^2)/qg
[l/hour]	[cm^3/s]	[V]	[atm]	[atm^2]	[1/atm]	mD	[atm^2/cm^3/s]	mD	[atm^2/cm^3/s]
10	4,1667	1,040	1,0382	0,0981	0,98615	925,3929	0,02354	1013,0238	0,0215
15	6,2500	1,051	1,0572	0,1379	0,97700	987,3283	0,02206	1003,7502	0,0217
20	8,3333	1,064	1,0797	0,1859	0,96640	976,6169	0,02230	993,0101	0,0219
25	10,4167	1,076	1,1004	0,2310	0,95682	982,0421	0,02218	983,3009	0,0221
30,3	12,6250	1,090	1,1246	0,2848	0,94588	965,4354	0,02256	972,2141	0,0224
35	14,5833	1,102	1,1453	0,3319	0,93670	957,1162	0,02276	962,9109	0,0226
40	16,6667	1,114	1,1660	0,3798	0,92769	955,8809	0,02279	953,7866	0,0228
45	18,7500	1,126	1,1867	0,4285	0,91886	953,0082	0,02286	944,8361	0,0231
50	20,8333	1,139	1,2092	0,4823	0,90948	940,8024	0,02315	935,3301	0,0233
55	22,9167	1,151	1,2299	0,5329	0,90099	936,7122	0,02325	926,7260	0,0235
60	25,0000	1,166	1,2558	0,5973	0,89059	911,6953	0,02389	916,1941	0,0238
65	27,0833	1,180	1,2800	0,6586	0,88111	895,7200	0,02432	906,5813	0,0240
70,1	29,2083	1,191	1,2990	0,7076	0,87379	899,1113	0,02423	899,1709	0,0242
75,5	31,4583	1,205	1,3232	0,7710	0,86466	888,7393	0,02451	889,9155	0,0245
80	33,3333	1,216	1,3422	0,8216	0,85762	883,6741	0,02465	882,7780	0,0247
85,1	35,4583	1,227	1,3612	0,8730	0,85069	884,7077	0,02462	875,7559	0,0249
90	37,5000	1,242	1,3871	0,9442	0,84141	865,0955	0,02518	866,3612	0,0251
95	39,5833	1,255	1,4095	1,0070	0,83354	856,2168	0,02544	858,3832	0,0254
100	41,6667	1,268	1,4320	1,0708	0,82581	847,5816	0,02570	850,5531	0,0256

Linear regression 1 (k∞)			
Slope	Intersection		
1013,285065	13,76803478	kg	
43,73817058	38,69534609		
Reg coeff. 0,976351293	6,300349863		
536,7129263	13		
21304,50209	516,0273092		
"b" param.:	73,5969		

Linear regression 2 (kabs)			
Slope	Intersection		
0,0001	0,0210	B	or A_0

kg [mD]	14
ka [mD]	1037

kg=	14	*	[1 +	73,5969 * 1 / pavg]
ka [mD]	1037,30