



# SURFER FOR WINDOWS HANDS ON TRAINING

Hydrogeological Engineering MSc mesterszak

2017/18 II. félév

TANTÁRGYI KOMMUNIKÁCIÓS DOSSZIÉ

**Miskolci Egyetem**  
**Műszaki Földtudományi Kar**  
**Környezetgazdálkodási Intézet**

## **Tartalomjegyzék**

1. Tantárgyleírás, tárgyjegyző, óraszám, kreditérték
2. Tantárgytematika (óraóra lebontva)
3. Minta zárthelyi
4. Vizsga tételsor

## 1. Tantárgyleírás, tárgyjegyző, óraszám, kreditérték

<b>Course title: Surfer for windows hands on training</b> <b>Instructor:</b> Dr. Mikita Viktória	<b>Code: MFKHT73005</b> <b>Responsible department/institute:</b> Hidrogeológiai-Mérnökgeológiai Intézeti Tanszék/ Környezetgazdálkodási Intézet <b>Type of course:</b>
<b>Position in curriculum (which semester):</b> 6	<b>Pre-requisites (if any):</b> no
<b>No. of contact hours per week (lecture + seminar):</b> 2+2	<b>Type of Assessment (examination/ practical mark / other):</b> exam
<b>Credits:</b> 3	<b>Course:</b> full time
<b>Course description</b> The students will be able to use the most common practical applications of the Surfer for Windows software. They will be able to solve some engineering tasks related to area and volume integral problems they can edit various maps and perform data processing tasks.  The short curriculum of the object: <ul style="list-style-type: none"> <li>- The theoretical background of grid files, introduction to interpolation algorithms</li> <li>- Math with grid files, volume calculations</li> <li>- 2D mapping techniques: base maps, contour maps, post maps, vector maps</li> <li>- 2.5 D spatial mapping techniques: 3D wireframe, surface and watershed maps</li> <li>- Data transfer to Processing MODFLOW</li> </ul>	
Competencies to evolve: <b>Knowledge:</b> T4 – Have a working knowledge of computer-aided design and analysis T5 – Knows and understands hydrogeological modelling techniques. T6 – Knows basic requirements of environmental protection, quality control, consumer protection, product liability, equal access approach, occupational health and safety, technical and economic legislation and engineering ethics. T7 – Have knowledge of a wide range of problem-solving techniques for research or academic work. <b>Ability:</b> K1 – Ability to understand the laws and relationships related to the location, movement and quality of groundwater, to apply and put into practice the knowledge acquired, and to use problem-solving techniques. K2 – Ability to process information from the knowledge frontiers of professional experience of the discipline, ability of problemsolving, and interpreting hydrogeological issues. K3 – Ability to independently plan and execute tasks related to groundwater exploration, exploitation and well hydraulics at a high professional level. K4 – Ability to effectively apply water production techniques and knowledge of modern well construction technologies. K5 – Ability to apply design, knowledge and technologies related to water supply and water treatment at a high level. K13 – The ability to independently participate in and manage research, development and expertise in the field of hydrogeology <b>Attitude:</b> A1 – Open-minded and receptive, active in learning about professional and technological methodological developments in the fields of geosciences and environmental engineering, and in solving geological problems from an engineering perspective A2 – Open and sensitive to problems and sustainability issues related to the environment and its elements <b>Autonomy and responsibility:</b> F1 – Act independently and proactively to solve professional problems. F3 – Takes decisions independently and in consultation with other disciplines (mainly legal, economic, energy and environmental), for which it takes responsibility.	

**Assessment and grading:** Students will be assessed with using the following elements.

Attendance:	15 %
Short quizzes	10 %
Midterm exam	40 %
Final exam	35 %
Total	100%

Grading scale:

% value	Grade
90 -100%	5 (excellent)
80 – 89%	4 (good)
70 - 79%	3 (satisfactory)
60 - 69%	2 (pass)
0 - 59%	1 (failed)

**Compulsory and recommended literature resources:**

Surfer 12 Users Guide, Golden Software Inc., 2014. Denver.

Hamilton, D.E.-Jones, T.A.: Computer modeling of geological surfaces and volumes. - AAPG Computer applications in geology. No.1. p589. Tulsa, Oklahoma

## 2. TANTÁRGY TEMATIKA

Surfer for Windows hands on training  
Tantárgytematika (ÜTEMTERV)  
Aktuális tanév tavaszi félév  
Hydrogeological Engineering MSc, 2. félév, törzsanyag tárgy

Hét	Előadás
1.	Introduction
2.	The basics of Surfer for windows software
3.	Theory of grid files- interpolation techniques
4.	Create simple line drawings
5.	Simple mathematical operations with grid files
6.	2D mapping techniques, contour maps
7.	3D mapping techniques, 3D surfaces
8.	Data transfer to Processing Modflow
9.	Grid operations, volume calculations
10.	Bányász sportnap (oktatási szünet)
11.	Surfer specific features (Slope, Watershed)
12.	Classroom task
13.	Midterm exam 1
14.	Additional midterm exam 1

### 3) MIDTERM EXAM SAMPLE

#### Surfer for windows hands on training c. course midterm exam

**1. subtask (6 point)**

From the given data (*DEM.dat*, *waterlevel.dat*, *bottom.dat*) create the surface contour map, the waterlevel distribution map and the bottom of the aquifer.

**2. subtask (2 point)**

Create a 2 classes-classified post map from the *borrow.dat* file.

**3. subtask (3 point)**

Make the dissolved chloride contamination distribution map in the area from the *chloride.dat* file, highlighted the 250 mg/l isoline.

**4. subtask (5 point)**

Determine the amount of contamination at the investigated area! The missing information (etc. porosity) are up to you.

**5. subtask (4 point)**

Determine the size of the contaminated area below 1000 mg/l contamination, and above 3000 mg/l chloride.

**Grading:**

excellent (5): 18-20

good (4): 16-17.5

satisfactory (3): 14-15.5

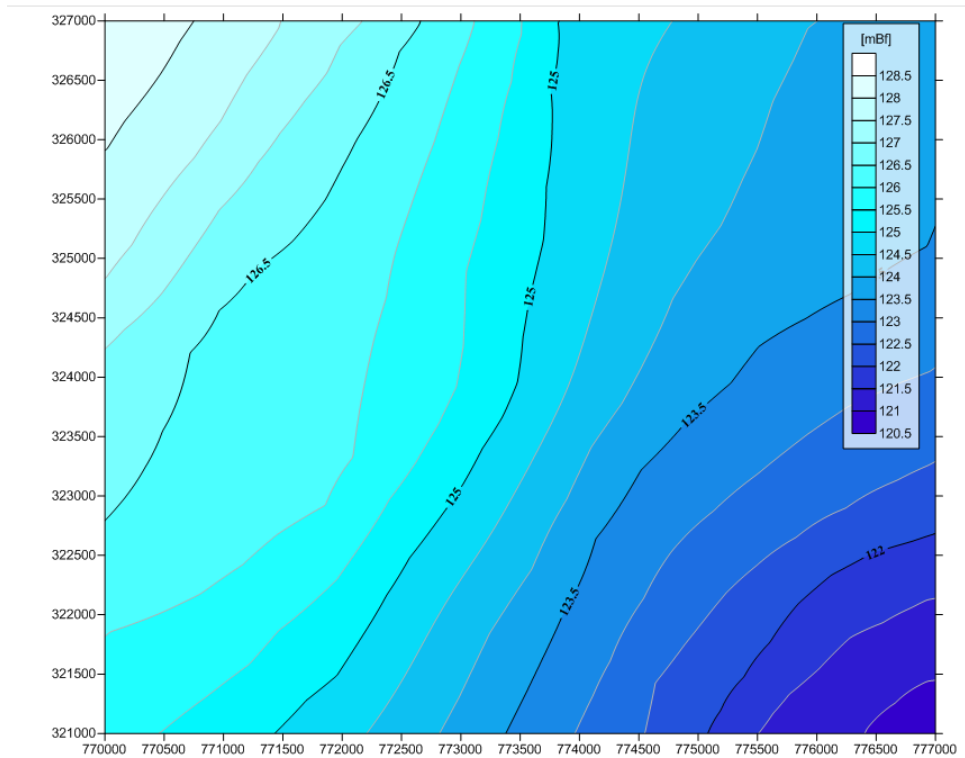
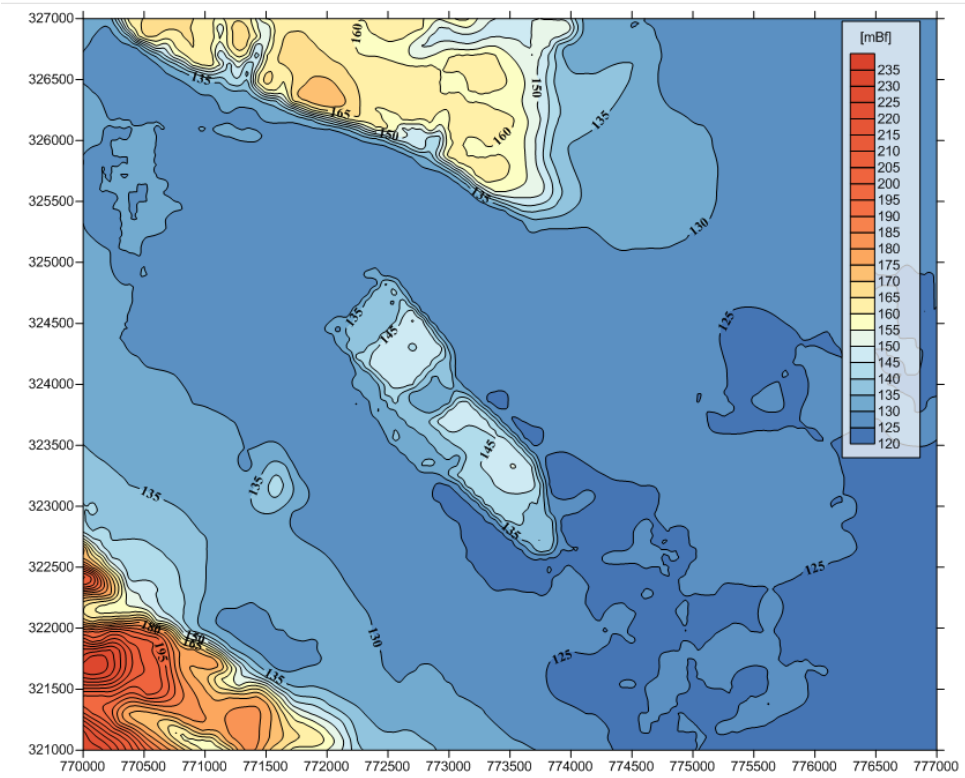
passed (2): 12-13,5

failed (1): 0-11.5

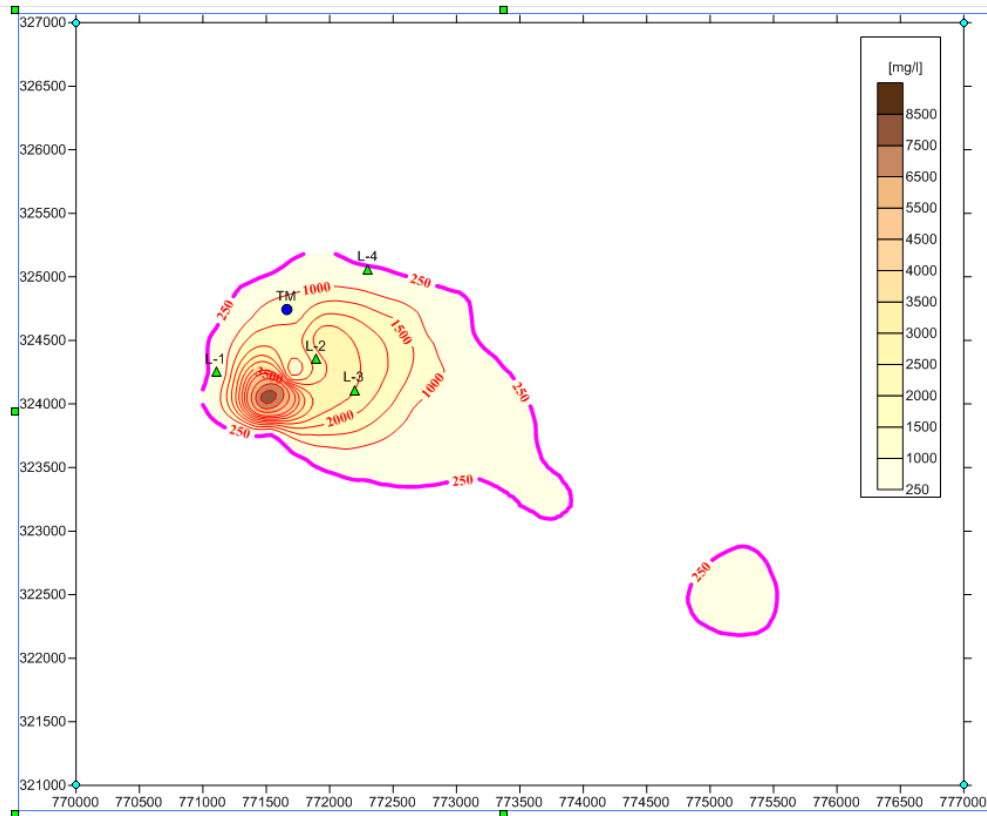
# Surfer for windows hands on training midterm exam

The exam contains digital files!

## 1. subtask



### 2-3. subtask



### 4. subtask

Calculation of the amount of contamination:

$$M = \int c \cdot h_0 \cdot n_0 \cdot dx dy$$

$$M=7270 \text{ kg}$$

### 5. subtask

size of the area above 3000 mg/l: 208.985 m<sup>2</sup>

size of the area below 1000 mg/l: 1.973.100 m<sup>2</sup>



## **5. OTHER REQUIREMENTS**

During the exams using of mobile phone, smart devices, notes or copies of books are not acceptable. Violation of the examination order entails the suspension and completion of the writing of the exam.