



GEOHERMAL ENERGY

MSc in Petroleum Engineering **MFKOT740011**

COURSE DESCRIPTION

**FACULTY OF EARTH AND
ENVIRONMENTAL SCIENCES AND ENGINEERING
MINING AND ENERGY INSTITUTE**

2026. Fall Term

Course Data Sheet

Course Title: Geothermal Energy Instructor: Dr. Anikó Nóra TÓTH, associate professor	Code: MFKGT740011 Responsible department/institute: DNGE/IPNG (GMTSZ/KFGI)
	Course Element: Compulsory
Position in curriculum* (which semester): 1 (4)	Pre-requisites (if any): no
No. of contact hours per week (lecture + seminar): 2+0	Type of Assessment (examination / practical mark / other): practical mark
Credits: 3	Course: full time
Course Description: This is a graduate course covering the natural conditions, production and utilization, environmental impact of geothermal energy. The purpose of this course is to provide you with a broad understanding of these topics and their history, which will prove useful in other courses, your individual research, reading of the literature, and engineering practice. Information in this class can be applied prospecting and design of geothermal production technology and equipment together with the surface facilities of utilization. We will rely primarily on lectures and teamwork to develop your understanding of these principles. You will be expected to read and think about material outside class, and to take part actively in class discussions. These discussions will enhance the learning process, allow sharing of experiences, and hopefully make this course more interesting. Topics Included: 1. Geothermal energy phenomena. 2. Geothermal reservoirs. 3. Geothermal heat flow. 4. Simple analytical reservoir models. 5. Geothermal drilling practice. 6. Well test analysis 1. 7. Well test analysis 2. 8. Heat transfer in geothermal wells. 9. Production from a geothermal well. 10. Steam and hot water transmission by pipe-line. 11. Direct application. EGS system. 12. Sustainability and depletion. 13. Geothermal heat pump. 14. Environmentaleffects. Competencies to evolve: Knowledge: T1, T11 Ability: K1, K5, K6, K7, K8, K9, K10, K11 Attitude: Autonomy and responsibility: F6, F7	
Assessment and grading:	Grading scale: % value Grade

Students will be assessed with using the following elements.		90 -100%	5 (excellent)
Attendance:	5 %	80 – 89%	4 (good)
Homework	10 %		3
Midterm exam	40 %	70 - 79%	(satisfactory
Final exam	45 %		)
Total	100%	60 - 69%	2 (pass)
		0 - 59%	1 (failed)
Compulsory or recommended literature resources:			
• A. Toth and E. Bobok: Flow and Heat Transfer in Geothermal Systems, Elsevier, Amsterdam, London, New York, Tokyo, 2016, ISBN: 9780128002773, 2016 • A. Toth: Heat Pumps, Digitalis jegyzet, Miskolci Egyetem, Miskolci Egyetem, 2014. http://www.tankonyvtar.hu/hu/ • A. Toth: Geothermal Direct Uses, Digitalis jegyzet, Miskolci Egyetem, Miskolci Egyetem, 2014. http://www.tankonyvtar.hu/hu/ • Ronald DiPippo: Geothermal Power Plants, Elsevier, 2013, ISBN: 978-0-08-098206-9 • R. Horne: Modern Well Test Analysis: A Computer-Aided Approach. Petroway, Inc., 1995, ISBN 0-9626992-1-7. • J.W. Lund: Geothermal Direct-Use Engineering and Design Guidebook. Geo-Heat Center			

Course Schedule for 2026/27 school year

Date	Topic
2026.09.11	Geothermal energy phenomena. Geothermal reservoirs.
2026.09.18	Geothermal heat flow. Simple analytical reservoir models.
2026.09.25	Geothermal drilling practice.
2026.10.02	Well test analysis.
2026.10.09	Test writing.
2026.10.16	Heat transfer in geothermal wells.
2026.11.06	Production from a geothermal well.
2026.11.13	Steam and hot water transmission by pipe-line.
2026.11.20	Direct application. EGS system.
2026.11.27	Sustainability and depletion.
2026.12.04	Geothermal heat pump. Environmental effects.
2026.12.11	Test writing.

Examination review questions

- Geothermal energy phenomena.
- Geothermal reservoirs.
- Geothermal heat flow.
- Simple analytical reservoir models.
- Geothermal drilling practice.
- Well test analysis 1.
- Well test analysis 2.
- Heat transfer in geothermal wells.
- Production from a geothermal well.
- Steam and hot water transmission by pipe-line.
- Direct application. EGS system.
- Sustainability and depletion.
- Geothermal heat pump.
- Environmental effects.