



NATIONAL TECHNICAL UNIVERSITY OF ATHENS

School of Civil Engineering – Geotechnical Department

Computational Methods in the Analysis of Underground Structures

Spring Term 2024 – 25

Lecture Series in Postgraduate Programs:

- 1. Analysis and Design of Structures (DSAK)**
- 2. Design and Construction of Underground Structures (SKYE)**

Instructor: Michael Kavvadas, Emer. Professor NTUA

Lectures: Wednesday 13:30 – 16:00 (Room 11 CE)

Teaching Assistant: Dimitris Georgiou, PhD, NTUA

Course educational material is available at: <https://helios.ntua.gr/course/view.php?id=5225>

15.03.2025



Computational Methods in the Analysis of Underground Structures

GENERAL

LATEST ANNOUNCEMENTS

COURSE INFO (Click for mo...

COURSE DISCUSSION FORU...

MAIN EDUCATIONAL MAT...

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Selected recorded lectures

PROBLEM SETS (for soluti...

PS No 1: EXCEL Spreadshee...

PS No 2: Convergence-Con...

PS No 3: Use of ROCSUPPO...

PS No 4: Use of RS2 softwar...

PS No 5: Use of RS2 softwar...

PS No 6: Use of RS2 softwar...

PS No 7: Use of RS2 softwar...

OTHER EDUCATIONAL MA...

Reading Material

Supplementary Material

GENERAL



LATEST ANNOUNCEMENTS

Classes start on Wednesday 12 February 2025, 13:30 - 16:00, in Room 11 (Civil Engineering Building - Zografou Campus).

The time-table of the lectures is listed below (COURSE INFO).



COURSE INFO (Click for more ...)

The course is offered in the English language, in the Spring Semester of 2024-25.

Lectures: Wednesdays, 13:30 - 16:00, Room 11 Civil Engineering Building, Zografou Campus.

Course Instructor: Prof (Emer) Michael Kavvadas, email: kavvadas@central.ntua.gr Web: <http://users.ntua.gr/kavvadas/>

Teaching Assistant: Dr. Dimitris Georgiou, email: dg-georgiou@hotmail.com

If any lecture cannot be taught with physical presence, it will be given remotely (via Webex) at the following address: <https://centralntua.webex.com>



COURSE DISCUSSION FORUM



MAIN EDUCATIONAL MATERIAL



PowerPoint Lecture Presentations

PDF (colour) versions of the lecture presentations



Selected recorded lectures

Course website: <https://helios.ntua.gr/course/view.php?id=5225>



Computational Me

PowerPoint Lecture Presentations

PDF (colour) versions of the lecture presentations

Edit



[\[MK 00\] Tunnel Introduction.pdf](#)



[\[MK 01\] Tunnel Introduction.pdf](#)



[\[MK 02\] Stress-Strain distributions.pdf](#)



[\[MK 03\] Convergence-Confinement.pdf](#)



[\[MK 04\] NATM Technology.pdf](#)



[\[MK 05\] Face stability.pdf](#)



[\[MK 06\] Final lining.pdf](#)



[\[MK 07\] Finite element analysis.pdf](#)

Course website: <https://helios.ntua.gr/course/view.php?id=5225>

PROBLEM SETS (for solution and submission)

 PS No 1: EXCEL Spreadsheet for GRC and LDP curves 

Opened: Thursday, 20 February 2025, 12:01 AM **Due:** Thursday, 6 March 2025, 11:59 PM

 PS No 2: Convergence-Confinement 

Opens: Thursday, 20 March 2025, 12:00 AM **Due:** Friday, 4 April 2025, 11:00 PM

 PS No 3: Use of ROCSUPPORT software 

Opened: Wednesday, 12 March 2025, 12:00 AM **Due:** Sunday, 23 March 2025, 11:00 PM

 PS No 3A: Report on NATM 

Opens: Wednesday, 19 March 2025, 4:00 PM **Due:** Wednesday, 2 April 2025, 11:59 PM

 PS No 3B: Tunnel face Stability 

Opens: Wednesday, 26 March 2025, 4:00 PM **Due:** Wednesday, 9 April 2025, 11:59 PM

 PS No 4: Use of RS2 software (Application No 1) 

Opens: Friday, 18 April 2025, 12:00 PM **Due:** Saturday, 3 May 2025, 11:00 PM

 PS No 5: Use of RS2 software (Application 2) 

Opens: Monday, 21 April 2025, 8:00 AM **Due:** Monday, 19 May 2025, 11:55 PM

 PS No 6: Use of RS2 software (Application 3) 

Opens: Thursday, 8 May 2025, 1:18 PM **Due:** Tuesday, 24 June 2025, 11:55 PM

 PS No 7: Use of RS2 software (Application 4) 

Opens: Tuesday, 27 May 2025, 11:39 AM **Due:** Tuesday, 24 June 2025, 11:59 PM



OTHER EDUCATIONAL MATERIAL



Reading Material

Documents, papers, etc.



Supplementary Material

Computational Methods in the Analysis of Underground Structures

No	Date	Lecture Description	Instructor	Lecture No
1	12/2	Introduction Distribution of stress and deformation around a cylindrical tunnel	MK	00, 01, 02
2	19/2	Distribution of stress and deformation around a cylindrical tunnel PROBLEM 1: EXCEL Spreadsheet for GRC and LDP curves	MK	02
3	26/2	Tunnel analysis with the convergence-confinement method	MK	03
4	5/3	Tunnelling with NATM (New Austrian Tunnelling Method)	MK	04
5	12/3	PROBLEM 2 : Use of the convergence-confinement method PROBLEM 3: Analysis of tunnel support with ROCSUPPORT	DG	
6	19/3	Analysis of tunnel face stability – Part 1 PROBLEM 3A: Report on the use of NATM	MK	05
7	26/3	Analysis of tunnel face stability – Part 2 PROBLEM 3B: Analysis of face stability	MK	05
8	2/4	2D numerical models for tunnel excavation and support Use of the Finite Element Method	MK	07
9	9/4	PROBLEM 4 : Tunnel numerical model with software RS2	DG	
	16/4, 23/4	NO CLASS – EASTER HOLIDAYS		
10	30/4	PROBLEM 5 : Tunnel numerical model with software RS2	DG	
11	7/5	PROBLEM 6 : Tunnel numerical model with software RS2	DG	
12	14/5	Analysis of the final lining of tunnels	MK	06
13	21/5	PROBLEM 7 : Analysis of the final lining with software RS2	DG	