

## SYLLABUS

### 1. Data about the program of study

1.1	Institution	Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Civil Engineering
1.3	Department	Structural Mechanics
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Civil Engineering (english) / Civil Engineer
1.7	Form of education	Full time
1.8	Subject code	4.00

### 2. Data about the subject

2.1	Subject name			Applied Informatics				
2.2	Subject area			Civil Engineering				
2.3	Course responsible/lecturer			Assoc.prof. F.-Zsongor GOBESZ – go@mecon.utcluj.ro				
2.4	Teachers in charge of seminars			Ilinca MOLDOVAN – ilinca.lungu@mecon.utcluj.ro				
2.5	Year of study	1	2.6 Semester	1	2.7 Assessment	C	2.8 Subject category	DF DI

### 3. Estimated total time

3.1	Number of hours per week	4	3.2 of which, course:	2	3.3 applications:	2
3.4	Total hours in the curriculum	56	3.5 of which, course:	28	3.6 applications:	28
Individual study						hours
Manual, lecture material and notes, bibliography						8
Supplementary study in the library, online and in the field						3
Preparation for seminars/laboratory works, homework, reports, portfolios, essays						6
Tutoring						–
Exams and tests						2
Other activities						–
3.7	Total hours of individual study	19				
3.8	Total hours per semester	75				
3.9	Number of credit points	3				

### 4. Pre-requisites (where appropriate)

4.1	Curriculum	none
4.2	Competence	none

### 5. Requirements (where appropriate)

5.1	For the course	Classroom with blackboard, video projector and screen.
5.2	For the applications	Lab room with PCs, video projector and screen.

### 6. Specific competences

Professional competences	<p>After completing the syllabus, the students will be able to:</p> <ul style="list-style-type: none"> <li>- use the MS Windows operating system (individually and sharing resources in LAN);</li> <li>- create and handle electronic documents (word processing, spread sheet etc.);</li> <li>- model and solve specific mathematical problems by using Mathcad (or similar software);</li> <li>- use AutoCAD for engineering sketches, simple graphic models, viewing and plotting;</li> <li>- develop and run an AutoLISP file in AutoCAD;</li> <li>- transfer data through network, or by using network storage or external drives.</li> </ul>
Cross competences	<p>Knowledge and experience of employing efficient and responsible work strategies, punctuality, seriousness and liability based on the principles, norms and values of professional ethics.</p> <p>Applying efficient technics in team work.</p> <p>Development of self-expression, vocabulary and technical culture.</p> <p>Professional and personal development through continuous training and active adaptation to new technical specifications.</p>

## 7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	To develop skills in applied informatics and to be able to create and modify electronic documents in engineering.
7.2	Specific objectives	Assimilation of theoretical and practical knowledge about the use of computers and of some usual software.

## 8. Contents

8.1. Lecture (syllabus)	Teaching methods	Notes
Introduction. Overview, objectives, how to conduct the discipline. Brief history of computer equipment and information technology, fundamental concepts, hardware, evolutionary aspects.	Oral and written presentation with examples and comments	Stimulating interactive participation
Operating systems. Concepts, developments and trends, main components and functions. Physical and logical aspects of storing and managing data. File extensions and usual formats.		
Algorithms, methods and descriptive tools. Concepts, method classifications and paradigms. Task analysis and software development stages. Analysis and method description tools. Structuring concepts. Types of errors in data collection and automatic data processing.		
Office software – the content and the structure of an electronic document. Text editing, settings, processing and formatting. Embedded parts through software interconnectivity. Expressions, tables, drawings, images and references inserted in a document. Conversion options and possibilities.		
Office software – spreadsheet calculus, reference types, expressions and formulas. Addressing cell ranges. Moving and copying content, merging and dividing cells. Formula types, correcting errors. Graphics for sets of values.		
AutoCAD – the user interface. Use and configuration of the menus. Model space, reference systems, absolute and relative coordinates. Modifying the coordinate system (UCS / WCS). Managing layers. Command types. Assisting tools (OSNAP, GRID, ORTHO etc.). Selecting entities.		
AutoCAD – setting and using viewing panels. Sample 3D modeling by using several viewing panes. Creating cross sections. Computing geometrical-mechanical characteristics of areas.		
AutoCAD – line and hatch types, characteristics and properties. Text types, special characters. Dimensioning commands and settings.		

AutoCAD – blocks and attributes. Creating and exploding composed entities. Saving blocks as files, inserting blocs in the model. Commands for define, modify and extract attributes. Creation and use of symbol libraries. Paper space, plotting and printing issues.		
AutoLISP – introduction, basic concepts. Atoms and functions. Use of AutoLISP in the Command Line. Development of an AutoLISP file, sample. Defining variables, settings.		
Visual LISP – running in AutoCAD, user interface, opening and loading of an AutoLISP file under Visual LISP, the use of an AutoLISP routine (inspection, debugging). The use of AutoCAD commands in AutoLISP programs.		
AutoLISP functions for list processing, conditional structures, loops, the use of modeled entities with their properties.		
Data and communication networks. Roles, fundamental topologies, network types. Internet – basic aspects. GSM environment, evolution.		
BIM – introduction, history (XML applications in civil engineering), basic sample model and viewing options.		
<b>Theory assessment (T).</b>		
Bibliography <ol style="list-style-type: none"> <li>1. Lecture notes.</li> <li>2. <i>Basic Computing Using Windows</i>, Wikibooks.org, 2006.</li> <li>3. Máthé, A. – Nedelcu, M.: <i>Aplicații AutoCAD și AutoLISP. Îndrumător de laborator</i>. Editura U.T.PRESS, Cluj-Napoca, 2009.</li> <li>4. Petrina, M. – Bâlc, R. – Máthé, A. et alii: <i>Programarea calculatoarelor în construcții. Aplicații în FORTRAN, EXCEL și MATHCAD</i>, Editura U.T.PRESS, Cluj-Napoca, 2007.</li> <li>5. Petrina, M. - Bâlc, R. - Máthé, A. – Petrina, B. et alii: <i>Utilizarea mediului grafic AutoCAD și Programare în AutoLISP. Aplicații în construcții</i>, Editura U.T.Pres, Cluj-Napoca, 2006.</li> <li>6. <a href="https://www.microsoft.com/EN-US/microsoft-365/">https://www.microsoft.com/EN-US/microsoft-365/</a></li> <li>7. <a href="http://www.autodesk.com">www.autodesk.com</a></li> <li>8. <a href="http://buildingsmart.org">http://buildingsmart.org</a> (Open BIM, IFC)</li> <li>9. <a href="http://users.utcluj.ro/~go/">http://users.utcluj.ro/~go/</a> (handouts and further resources)</li> </ol>		
8.2. Applications/Seminars	Teaching methods	Notes
Presentation of the laboratory and of the equipment, health and safety issues, rules of conduct, organizational aspects. How to use the equipment and peripherals, available resources. Expected portfolio and assessment.		
SMath / Mathcad – user interface, simple exercises (solving equations, integral and differential expressions). Issues concerning errors, accuracy and measuring units.		
SMath / Mathcad – symbolic calculus in linear algebra. Solving linear equations, direct methods. Solving triangular systems, the Gauss method. Graphics.	Short presentation, examples and solutions with discussion, followed by individual subjects for each student.	Each student has to work on a PC, the solved topics will be checked and assessed weekly by the teacher. After each chapter there will be a practical partial
SMath / Mathcad – approximate solving of algebraic equations: Newton method, chord method, successive approximations method. Solving nonlinear systems.		
SMath / Mathcad – matrix calculus (addition / subtraction, multiplications, invert, calculation of the determinant of a matrix).		
<b>Partial assessment: SMath / Mathcad (PM).</b> Office applications, creating an electronic document, settings, processing and formatting issues. Embedded objects, links and interconnectivity. Expressions, charts, drawings, images and		

references included in a document. Conversion between common electronic formats.		assessment.
Use of spreadsheets, layouts, calculus, charts, embedded objects and links, references.		
Use of conditions (IF) in spreadsheet expressions. Conditional formatting. Editing an electronic document containing table and chart (software connectivity).		
<b>Partial assessment: Office software (PB)</b> AutoCAD – user interface. Simple commands to create and modify entities. Selection types. Managing layers. Assisting tools (GRID, OSNAP, ORTHO etc. Viewing and modifying system variables.		
AutoCAD – exercise using skew, scale, mirror, multiply, distribute, align etc. Computing the geometrical-mechanical characteristics of areas.		
AutoCAD – setting and use of viewing panes. 3D modeling exercise. Hatches. Dimensioning styles and commands.		
AutoCAD – blocks and attributes. Creation and decomposition of complex entities. Saving blocks as files, inserting in the model. Defining and extracting attributes.		
AutoCAD – development of an AutoLISP routine for solving a 2 <sup>nd</sup> grade equation and drawing it.		
<b>Partial assessment: AutoCAD and AutoLISP (PA).</b> Portfolio rating and discussion of the work done during the semester.		
Bibliography <ol style="list-style-type: none"> <li>1. Class notes and hand-outs.</li> <li>2. Máthé, A. – Nedelcu, M.: <i>Aplicații AutoCAD și AutoLISP. Îndrumător de laborator</i>. Editura U.T.PRESS, Cluj-Napoca, 2009.</li> <li>3. Petrina, M. – Bâlc, R. – Máthé, A. et alii: <i>Programarea calculatoarelor în construcții. Aplicații în FORTRAN, EXCEL și MATHCAD</i>, Editura U.T.PRESS, Cluj-Napoca, 2007.</li> <li>4. Petrina, M. - Bâlc, R. - Máthé, A. – Petrina, B. et alii: <i>Utilizarea mediului grafic AutoCAD și Programare în AutoLISP. Aplicații în construcții</i>, Editura U.T.Pres, Cluj-Napoca, 2006.</li> <li>5. <a href="https://en.smath.com">https://en.smath.com</a></li> <li>6. <a href="https://www.ptc.com/en/products/mathcad">https://www.ptc.com/en/products/mathcad</a></li> <li>7. <a href="https://www.microsoft.com/EN-US/microsoft-365/">https://www.microsoft.com/EN-US/microsoft-365/</a></li> <li>8. <a href="http://www.autodesk.com">www.autodesk.com</a></li> <li>9. <a href="http://users.utcluj.ro/~go/">http://users.utcluj.ro/~go/</a> (samples and further resources)</li> </ol>		

**9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field**

Acquired skills will be needed by engineers working in building design and/or research (also in education).
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**10. Evaluation**

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	Theory (T)	Written test.	40%
10.5 Applications	Activity during the semester (L)	Assessment of each lab work and home work.	20%

	Practical knowledge (A)	3 practical assessments (PM, PB, PA) on computer.	40%
10.6 Minimum standard of performance			
<p>Solving and handing over of lab works by deadlines and getting at least 4.5 points individually at each of the assessment and criteria (<math>L \geq 4.5</math> and <math>PM \geq 4.5</math> and <math>PB \geq 4.5</math> and <math>PA \geq 4.5</math> and <math>T \geq 4.5</math>).</p> <p>The colloquium consists of the theory part (T) and the application part (A). The grade for the applications part results from the evaluation of the 3 practical partial assessments: <math>A = (PM + PB + PA)/3</math>.</p> <p>The final grade will result from the formula: <math>0.2 \cdot L + 0.4 \cdot T + 0.4 \cdot A</math> (rounded to the nearest whole value).</p> <p>Condition for obtaining credits: (final) grade <math>\geq 5</math> (five).</p> <p>Remark: the score from partial assessments (application) is recognized as partial exam, but the theory (T) is recognized only in the current session.</p>			

Date of filling in:		Title Surname Name	Signature
17.06.2025	Lecturer	Assoc.prof. F.-Zsongor GOBESZ	
	Teachers in charge of application	Assistant prof. Ilinca MOLDOVAN	

Date of approval in the department of Structural Mechanics _____ 19.06.2025	Head of department Assoc.Prof. Anca G. POPA
Date of approval in the Faculty of Civil Engineering _____ 25.06.2025	Dean Prof. Daniela MANEA