

SYLLABUS / FIȘA DISCIPLINEI
1. Information on the study programme / Date despre programul de studii

1.1. Institution / Instituția de învățământ superior	Universitatea de Vest din Timișoara
1.2. Faculty / Facultatea	Matematică și Informatică
1.3. Department / Departamentul	Computer Science (Informatică)
1.4. Study program field	Computer Science (Informatică)
1.5. Study cycle/ Ciclul de studii	Bachelor / licență
1.6. Study programme / Programul de studii / calificarea*	Computer Science / Informatică în limba engleză / Database administration / <i>Administrator baze de date - 252101; Computer network administration / Administrator de rețea de calculatoare - 252301; Analyst / Analist - 251201; Research assistant in computer science / Asistent de cercetare în informatică - 214918; Teacher in secondary schools / Profesor în învățământul gimnazial - 233002; Programmer / Programator - 251202; Software systems designers / Proiectant sisteme informatice - 251101</i>

2. Information on the course / Date despre disciplină

2.1. Title of the course / Denumirea disciplinei	Graphics and User Interfaces					
2.2. Teacher in charge of the course / Titularul activităților de curs	Lect. Dr. Gaiănu Mihail					
2.3. Teacher in charge of the seminar / Titularul activităților de seminar	Lect. Dr. Gaiănu Mihail					
2.4. Study year / Anul de studii	3	2.5. Semester / Semestrul	2	2.6. Examination type / Tipul de evaluare: E(xam)/C(olloquim)	E	2.7. Course type / Regimul disciplinei: M(andatory)/ E(lective)/ F(acultative)

Formatted: Indent: First line: 1,27 cm

3. Estimated study time (number of hours per semester) / Timpul total estimat (ore pe semestru al activităților didactice)

3.1. Attendance hours per week / Număr de ore pe săptămână	4	out of which din care: 3.2 lecture/ curs	2	3.3. seminar/laborator	2
3.4. Attendance hours per semester / Total ore din planul de învățământ	20	out of which: 3.5 lecture / curs	10	3.6. seminar/laborator	10
Distribution of the allocated amount of time / Distribuția fondului de timp*					hours/ ore
Individual study /Studiu după manual, suport de curs, bibliografie și notițe					10
Supplementary documentation at library or using electronic repositories / Documentare suplimentară în bibliotecă, pe platformele electronice de specialitate					10
Preparing for laboratories, homework, reports etc. /Pregătire seminarii/laboratoare, teme, referate, portofolii și eseuri					20
Exams / Examinări					1

Tutoring / Tutorat		0
3.7. Total number of hours of individual study / Total ore studiu individual	41	
3.8. Total number of hours per semester / Total ore pe semestru	97	
3.9. Number of credits (ECTS) / Număr de credite	5	

4. Prerequisites (if it is the case) / Precondiții (acolo unde e cazul)

4.1. curriculum / de curriculum	programming, geometry, algebra
4.2. skills / de competențe	basic computer skills, analytical thinking

5. Requirements (if it is the case) / Condiții (acolo unde e cazul)

5.1. for the lecture / de desfășurare a cursului	projector
5.2. for the seminar, laboratory / de desfășurare a seminarului/laboratorului	A computer with a C compiler and OpenGL installed

6. Acquired skills / Competențe specifice acumulate

Professional skills / Competențe profesionale	<ul style="list-style-type: none"> Understanding the main principles of computer graphics Usage of specific libraries for developing computer graphics applications. Using third party libraries.
Transversal skills / Competențe transversale	<ul style="list-style-type: none"> Capacity to use knowledge from multiple domains and to glue them together with the aim of building a specific application.

7. Objectives of the course / Obiectivele disciplinei (reieșind din grila competențelor specifice acumulate)

7.1. General objective / Obiectivul general al disciplinei	<ul style="list-style-type: none"> gaining knowledge about computer graphics.
7.2. Specific objectives / Obiectivele specifice	<ul style="list-style-type: none"> understanding how the GPU and the rendering pipeline are working knowledge of at least one graphics library understanding that a graphics application is not just about programming but that it requires knowledge from multiple previously studied disciplines.

8. Content / Conținuturi*

8.1. Lecture / Curs	Teaching strategies / Metode de predare	Remarks, details / Observații
---------------------	---	-------------------------------

1. Introduction. Short history of computer graphics. Lecture syllabus.	Presentation. Interactive.	During lectures students will receive several projects. They aim to consolidate their understanding of how the basic graphics algorithms work. These projects will count in the final course grade.
2. Graphics devices for user interfacing. Rendering pipeline. Logical devices.	Presentation. Interactive.	
3. Digital images. Image processing. Operations with images.	Presentation. Interactive.	
4. Recap on vectors and matrices. Reference systems. Affine transformations.	Presentation. Interactive.	
5. Drawing graphics primitives.	Presentation. Interactive.	
6. Object modeling. Solid and procedural modeling.	Presentation. Interactive.	
7. Projection types.	Presentation. Interactive.	
8. Clipping algorithms for points, lines and polygons.	Presentation. Interactive.	
9. Visibility algorithms.	Presentation. Interactive.	
10-11. Direct and global illumination, Ray tracing.	Presentation. Interactive.	
12. Transparency and reflection.	Presentation. Interactive.	
13. Textures.	Presentation. Interactive.	
14. Reality through physics and artificial intelligence.	Presentation. Interactive.	
Recommended bibliography / Bibliografie		

- 1) J. Foley, A. van Dam, S. K. Feiner, J. F. Hughes, *Computer Graphics: Principles and Practice in C (2nd edition)*, Addison Wesley, 1997, ISBN 0-201-84840-6
- 2) Eric Lengyel, *Mathematics for 3D Game Programming & Computer Graphics (3rd edition)*, Course Technology PTR, 2011, ISBN 978-1-4354-5886-4
- 3) D. Petcu, L. Cucu, *Grafica pe calculator*, Tipografia Universitatii de Vest, 1999
- 4) D. Petcu, L. Cucu, *Principii ale graficii pe calculator*, Excelsior, 1995
- 5) D. Pop, D. Petcu, *Modelarea Lumii Tridimensionale*, Eubeea, 2004
- 6) David. M. Mount, *Computer Graphics Notes*, University of Maryland, 2004
<http://www.cs.umd.edu/~mount/427/Lects/427lects.pdf>
- 7) Adam Finkelstein, *Computer Graphics Lectures*, Princeton University, 2003,
<http://www.cs.princeton.edu/courses/archive/spr03/cs426/#Textbooks>
- 8) Paul. A. Farrell, *Computer Graphics Lecture Notes*, Kent University, 2005,
<http://www.cs.kent.edu/~farrell/cg05/lectures/index.html>

8.2. Seminar, lab / Seminar, laborator	Teaching/learning strategies / Metode de predare/ învățare	Remarks, details / Observații
1. Graphics APIs. Comparative study of several such APIs. C/C++ as language for graphics applications.	Presentation. Examples. Interactive.	Students will work either individually or pared. For the assignments given at the end of each lab they must work individually. These assignments will be checked during the next lab.
2. Hardware for computer graphics	Presentation. Examples. Interactive.	
3. Computational geometry. Coordinate systems	Presentation. Examples. Interactive.	
4. First OpenGL application. Drawing primitives (part 1). Coloring.	Presentation. Examples. Interactive.	
5. Drawint primitives (part 2).	Presentation. Examples. Interactive.	
6. Texturing.	Presentation. Examples. Interactive.	

7. Small application.	Presentation. Examples. Interactive.	
8. Simulating 3D. Depth, lighting and materials.	Presentation. Examples. Interactive.	
9. Handling a scene through affine transformations.	Presentation. Examples. Interactive.	
10. Loading complex 3D objects.	Presentation. Examples. Interactive.	
11. Small overview of what shaders are.	Presentation. Examples. Interactive.	
12. Subdivision curves, parametric surfaces	Presentation. Examples. Interactive.	
13. Subdivision surfaces, perception and color	Presentation. Examples. Interactive.	
14. Small application.	Presentation. Examples. Interactive.	

Recommended bibliography / Bibliografie

1) Dave Shreiner, *OpenGL Programming Guide (7th edition)*, Addison Wesley, 2009, ISBN 978-0-321-55262-4

2) Randi J. Rost, *OpenGL Shading Language (2nd edition)*, Addison Wesley, 2006, ISBN 978-0-321-33489-3

3) <https://classroom.google.com/c/MTA1NjQ5NjY4Nlpa>

9. Correlations between the content of the course and the requirements of the IT field / Coroborarea conținuturilor disciplinei cu așteptările reprezentanților comunității epistemice, asociațiilor profesionale și angajatorilor reprezentativi din domeniul aferent programului

- The lecture will be adapted to the local market requirements. This means that the APIs will be similar with those used in the local enterprises for creating interactive applications, games, etc.

10. Evaluation / Evaluare*

Activity / Tip de activitate	10.1. Evaluation criteria / Criterii de evaluare**	10.2. Evaluation methods / Metode de evaluare***	10.3. Weight in the averaged mark / Pondere din nota finală
10.4. Lecture / Curs	General knowledge about the terms and algorithms presented in the class.	Written exam.	30%
	Small projects to reflect basic graphics algorithms.	Project evaluation	20%
10.5. Seminar/ lab	Correctness of the assignments.	Oral assignment evaluation.	50%

10.6. Minimal knowledge for passing / Standard minim de performanță			
Oral assignment evaluation.			

Date/ Data completării
1.10.2016

Signature (lecture) /
Semnătura titularului de curs
Lect. Dr. Gaianu Mihail

Signature (seminar)
Semnătura titularului de seminar
Lect. Dr. Gaianu Mihail

Signature (director of the department)
Semnătura directorului de departament
Conf.dr. Victoria Iordan