

# COMPUTER GRAPHICS

<b>1</b>	Course Title:	COMPUTER GRAPHICS	
<b>2</b>	Course Code:	BMB3022	
<b>3</b>	Type of Course:	Optional	
<b>4</b>	Level of Course:	First Cycle	
<b>5</b>	Year of Study:	3	
<b>6</b>	Semester:	6	
<b>7</b>	ECTS Credits Allocated:	5.00	
<b>8</b>	Theoretical (hour/week):	3.00	
<b>9</b>	Practice (hour/week):	0.00	
<b>10</b>	Laboratory (hour/week):	0	
<b>11</b>	Prerequisites:	None	
<b>12</b>	Language:	Turkish	
<b>13</b>	Mode of Delivery:	Face to face	
<b>14</b>	Course Coordinator:	Dr. Öğr. Üyesi CEYDA NUR ÖZTÜRK	
<b>15</b>	Course Lecturers:		
<b>16</b>	Contact information of the Course Coordinator:	ceydanur@uludag.edu.tr	
<b>17</b>	Website:		
<b>18</b>	Objective of the Course:	To examine viewing procedures in two dimensions and three dimensions from modelling coordinates to device coordinates, and teach representations, techniques, and algorithms that are used in these procedures with weekly OpenGL applications.	
<b>19</b>	Contribution of the Course to Professional Development:	Develops different points of view and programming skills concerning rendering process from computer representations to realistic images.	
<b>20</b>	Learning Outcomes:		
		1	Being able to produce two dimensional and three dimensional renderings using graphics primitives
		2	Knowing polygon processing and drawing algorithms that work in raster area
		3	Being able to use representations that are based on meshes, Bézier curves, or B-splines
		4	Being able to design applications that involve interaction and animation
		5	Being able to apply simple and combined geometric transformations to the object models
		6	Being able to mathematically describe the transformations between different coordinate systems
		7	Being able to use realistic rendering techniques such as texturing and illumination
		8	Having knowledge about ray tracing and visible surface detection algorithms
		9	Having working principles of OpenGL library mastered
		10	
<b>21</b>	Course Content:		
		<b>Course Content:</b>	
Week	Theoretical	Practice	

1	Survey of computer graphics, graphics hardware and software, introduction to OpenGL	
2	Graphics output primitives: point, line, triangle, circle, and polygon; polygon fill areas	
3	Attributes of graphics primitives: colouring, blending, colour models, pattern filling	
4	OpenGL rendering pipeline, mouse and keyboard interactions, animation	
5	Splines: continuity conditions and representations; Bézier curves, B-splines	
6	Drawing algorithms: digital differential analysis and Bresenham line drawing algorithms, midpoint circle and ellipse drawing algorithms	
7	Two dimensional transformations: translation, rotation about a point, scaling, and shearing	
8	Two dimensional viewing procedures, clipping and viewport windows, line and polygon clipping algorithms	
9	Three dimensional transformations: translation, rotation about a general axis, scaling, and shearing; quaternions	
10	Three dimensional viewing procedures, viewing coordinate parameters, projection types, three dimensional clipping algorithms	
11	Surface texturing, illumination models, and surface rendering	
12	Hierarchical modelling and visible surface detection	
13	Global illumination and ray tracing methods	
14	OpenGL shading language	

22	Textbooks, References and/or Other Materials:	<p>1. Hearn, D. D., Baker, M. P., Carithers, W., 2011. Computer Graphics with OpenGL, Pearson Education, New Jersey, 4th Edition, ISBN: 978-0136053583.</p> <p>2. Vries, J. d., 2020. Learn OpenGL, Kendall &amp; Welling, ISBN-10: 9090332561 ISBN-13: 978-9090332567 URL: <a href="https://learnopengl.com/book/book_pdf.pdf">https://learnopengl.com/book/book_pdf.pdf</a>.</p> <p>3. Hughes, J. F., Van Dam, A., McGuire, M., Sklar, D. F., Foley, J. D., Feiner, S. K., Akeley, K., 2014. Computer Graphics Principles and Practice, Addison-Wesley Professional, 3rd Edition, ISBN: 9353068967.</p> <p>4. Shirley, P., Marschner, S., et al., 2009, Fundamentals of Computer Graphics, CRC Press, 4th Edition, ISBN: 978-1482229394.</p>
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23	Assesment		
TERM LEARNING ACTIVITIES		NUMBE R	WEIGHT
Midterm Exam		1	10.00
Quiz		0	0.00
Home work-project		6	30.00
Final Exam		1	60.00

Total	8	100.00
Contribution of Term (Year) Learning Activities to Success Grade		40.00
Contribution of Final Exam to Success Grade		60.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course	programming assignments, written exams, project	
<b>24</b>	<b>ECTS / WORK LOAD TABLE</b>	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	2.00	28.00
Homeworks	6	4.00	24.00
Projects	1	30.00	30.00
Field Studies	0	0.00	0.00
Midterm exams	1	12.00	12.00
Others	0	0.00	0.00
Final Exams	1	18.00	18.00
Total Work Load			154.00
Total work load/ 30 hr			5.13
ECTS Credit of the Course			5.00

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	4	3	4	4	3	3	3	0	3	2	0	0	0	0	0	0
ÖK2	5	2	1	3	1	1	1	0	1	0	0	0	0	0	0	0
ÖK3	4	5	3	3	2	2	1	0	2	0	0	0	0	0	0	0
ÖK4	4	4	3	4	2	3	2	0	2	1	0	0	0	0	0	0
ÖK5	5	5	2	3	2	3	2	0	1	1	0	0	0	0	0	0
ÖK6	5	5	2	3	1	2	1	0	1	0	0	0	0	0	0	0
ÖK7	3	4	4	4	2	3	2	0	2	1	0	0	0	0	0	0
ÖK8	5	4	3	4	1	1	1	0	2	0	0	0	0	0	0	0
ÖK9	5	2	5	5	2	3	3	3	3	2	2	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low			2 low			3 Medium			4 High			5 Very High			