ÓBUDA UNIVERSITY
JOHN VON NEUMANN FACULTY OF INFORMATICS

Institute of Applied Matematics						
Name of the subject: Asymptotic Analysis of Special Functions I	Code of the subject:	Credits:	Weekly hours:			
				lec	sem	lab
			full-time			
Responsible person for the subject: Prof. dr. habil Baricz Árpád			Classification:			
Subject lecturer(s): Prof. dr. habil Baricz Árpád						
Prerequisites:	Calculus	Complex analysis				
Way of the assessment:	Oral exam					

Course description	
Goal:	The goal is to provide an introduction into the asymptotic analysis of the most well-known special functions of classical analysis.
Course description:	This course gives a basic introduction into the basics of the asymptotic analysis of the special functions, which arise in applied mathematical sciences. It is our aim to present the most important methods of asymptotic analysis through examples of known special functions, like Bessel functions, Euler's gamma function, Riemann's zeta function and others.

Lecture schedule	
Education week	Topic
1.	Bessel functions
2.	Airy functions
3.	Orthogonal polynomials
4.	Hypergeometric functions
5.	Asymptotic analysis of integrals
6.	The method of partial integration
7.	Laplace method
8.	The Watson lemma
9.	Lagrange inversion theorem
10.	The stationary phase method
11.	The steepest descent method
12.	The saddle point method
13.	The WKB method
14.	Singularities and other asymptotic methods

Mid-term requirements	
Conditions for obtaining a mid-term grade/signature	

Assessment schedule	
Education week	Topic

Method used to calculate the *mid-term grade* (to be filled out only for subjects with mid-term grades)

Type of the replacement	
Type of the replacement of written test/mid-term grade/signature	

Type of the exam (to be filled out only for subjects with exams)	
Oral exam	
Calculation of the exam mark (to be filled only for subjects with exams)	
Final grade calculation methods:	

Achieved result	Grade
89%-100%	excellent (5)
76%-88<%	good (4)
63%-75<%	average (3)
51%-62<%	satisfactory (2)
0%-50<%	failed (1)

References

Obligatory:	1. F.W.J. Olver, *Asymptotics and Special Functions,* Academic Press, 1974. 2. N.M. Temme, *Special Functions,* John Wiley & Sons, 1996. 3. R. Wong, *Asymptotic Approximations of Integrals,* SIAM, 2001. 4. G.E. Andrews, R. Askey, R. Roy, *Special Functions*, Cambridge Univ. Press, 1999.
Recommended:	1. J.D. Murray, *Asymptotic Analysis,* Springer-Verlag, 1984. 2. P.D. Miller, *Applied Asymptotic Analysis*, American Mathematical Society, 2006.
Other references:	