Obuda University John von Neumann Faculty of Informatics	**Institute of Applied Mathematics**

Name and code: **Credits*:***

Asymptotic analysis of special functions I NMVAS1PMNE

2021/22 year I. semester

Subject lecturers: Prof. dr. habil. Arpad Baricz

Prerequisites (with code):	Calculus I, II			
Weekly hours:	Lecture:	Seminar.:	Lab. hours:	Consultation:
Way of assessment:				

Course description:

Goal: 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

Midterm requirements

Education week	*Topic*

Finalgrade 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)

Type of exam

Project presentation & Written exam

Type of replacement

Project presentation

References

Mandatory:

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.