

Program	Level		Third cycle	
	Name of the program		SEE Doctoral Studies in Mathematical Science	
<b>COURSE</b>				
Course title	<b>Parameter estimation</b>			
Course code	Semester	Course status	ECTS	Contact hours
AMAT 660	II	Elective course	10	30
Lecturer	Prof. Dr. Lejla Smajlović			
	Prof. Dr. Franz Kappel, Prof. Dr. Elisaveta Pancheva			
Course Goals	The course should provide a high level overview on a wide range of parameter estimation, test theory and optimal design			
<b>COURSE CONTENT</b>				
<ul style="list-style-type: none"> <li>- Point estimation theory: <ul style="list-style-type: none"> <li>o Output models</li> <li>o Assumptions on the measurement process</li> <li>o Properties of estimators</li> <li>o Fisher information Cramer-Rao theorem</li> </ul> </li> <li>- Least squares estimators: <ul style="list-style-type: none"> <li>o Nonlinear least squares</li> <li>o Nonlinear least squares</li> <li>o Linear approximation</li> <li>o Generalized least squares</li> <li>o Numerical methods</li> </ul> </li> <li>- Maximum likelihood estimation: <ul style="list-style-type: none"> <li>o Normal data</li> <li>o Non-normal data</li> </ul> </li> <li>- Bayesian estimation: <ul style="list-style-type: none"> <li>o Choice of prior distributions</li> <li>o Posterior distributions</li> <li>o Highest posterior density regions</li> <li>o Normal approximation to posterior density</li> </ul> </li> <li>- Asymptotic theory: <ul style="list-style-type: none"> <li>o Introduction</li> <li>o Least squares estimation</li> <li>o Maximum likelihood estimation</li> </ul> </li> <li>- Optimal experimental design: <ul style="list-style-type: none"> <li>o Introduction</li> <li>o Generalized measurement procedures</li> <li>o Probability measures on compact sets</li> <li>o Optimal design criteria in terms of the Fisher information matrix</li> </ul> </li> </ul>				
<b>LITERATURE</b>				
<p>[1] Fedorov, V. V., Theory of Optimal Experiments, Academic Press, New York 1972.</p> <p>[2] Florens, J.-P., Marchart, M., and Rolin, J.-M., Elements of Bayesian Statistics, Marcel Dekker, New York 1990.</p> <p>[3] Poazman, A., Foundations of Optimum Experimental Design, Mathematics and its Applications (East European Series), Reidel Publ. Comp., Dordrecht 1986.</p>				
<b>GRADING</b>			<b>REMARKS</b>	
Criterion	Maximum points	Minimum points		
Homeworks	20	12		
Project	50	26		
Final exam	30	17		
T o t a l	100	55		