# Department of Mathematics Faculty of Science

**MATH 772 (206772) THEORY OF PROBABILITY II**  **3(3-0-6)  
Prerequisite** MATH 771

**Course Descriptions :**

Sums of independent random variables. Central limit problems. Concept of conditioning. Martingales. Ergodic theorems. Second order random functions.

**Course Contents** **No. of Lecture Hours**

1. Martingale theory 10

- Conditional expectation

- Martingales

- Regular conditional probability

- L\_p\_ - inequality

2. Sum of independent random variables 10

- Convergence of random series

- Applications

- Martingale techniques

- Law of iterated logarithm

3. Convergence of distribution functions 10

- Weak convergence of probability measures

- Convergence to a normal distribution

4. L\_2\_ - stochastic processes 7

- Covariance functions

- Second order calculus

- Karhunen-Loeve expansion

- Estimation problems

5. Ergodic theory 8

- The pointwise ergodic theorem

- Applications to real analysis

- Applications to Markov chains

- The Shannon-McMillan theorem

Total 45