Project nº: 2019-1-TR01-KA203-077194

Project title: "ThinkBS - Promoting Deep and Wide Thinking / Early Dual Degrees in Basic Sciences"

Summer School - Debrecen

Time: July 4, Monday, 2022 - July 15, Friday
Online classes on worksdays of July 4-8, 9:00 -11:30 AM, and 1:00 – 3:30 PM
Project work and presentation on the week July 11-15

ThinkBS is a European Project implemented in a partnership of four universities from Turkey, Spain, Romania and Hungary aiming to improve applied mathematics skills of students and graduates in the field of engineering sciences.

During the first week of the summer school 2 online courses will be held with 3-3 class hours per day. On the next week the students get project work in groups, which will be presented on Friday 15th, Friday online for all other participants.

Course 1: Mathematics of Diagnostics (2 ECTS credits)
Lecturers: Prof. Dr. Imre Kocsis and Dr. Krisztián Deák
Taught online in the mornings, 9:00 – 11:30 AM
Description: Mathematical tools in the vibration diagnostics of machinery. Basics of machine diagnostics: quantities, measuring techniques, data acquisition, signal processing. An industrial condition monitoring system (software) related to the frequency spectrum. The foundations of some signal processing techniques presented through numerical examples. Methods for the detection of special faults; short-time Fourier transform, continuous and discrete wavelet transform, multiresolution analysis, interpretation of the scalogram. Matlab and Labview applications for filters and filter design (Butterworth, Chebyshev, Elliptic, Bessel filters). Introduction to filter design; FIR filters and adjustment of the coefficients.

Course 2: Introduction to Tomography (2 ECTS credits)
Lecturer: Dr. Ábris Nagy
Taught online in the afternoons, 1:00 – 3:30 PM
Description: An overview of the process of computed tomography. Data collection and basic concepts of reconstruction algorithms. Series expansion method and algebraic reconstruction techniques. Problems of uniqueness and consistency in discrete tomography. Switching components. Constructing binary matrices with prescribed row and column sum vectors. Network flow algorithm for discrete tomography.

The courses are offered free to students, PhD students, specialists interested in mathematics application in the fields of engineering and applied sciences. Participants will receive a Certificate of Attendance and Completion, equivalent to 2+2 ECTS credits.

Registration is open till June 30, at: https://forms.gle/KzW8FqGNbALfqJT39
you may send inquiries to: kozma@unideb.hu