**The procedure of independent teaching in the subject „Modeling of fluid flow with heat transfer“**

1) Study the textbooks "Modeling of heat, mass and momentum transfer – textbook” up to and including chapter 7.
2) Solve the examples of chapters 4,5 and 6 individually from the textbook “MODELING OF HEAT, MASS AND MOMENTUM - Tutorials”
3) Separately make elaborate (program) from the solution of the task of chapter 6 from the textbook " MODELING OF HEAT, MASS AND MOMENTUM – Tutorials”. Modify your assignment according to the enclosed Excel (Data-program.xls), where you will find information on the dimensions of the co-flow exchanger and flowing media and their physical properties. The resulting program should include the following points:

1. Description of the problem, physical properties, boundary conditions
2. Definition of mathematical model, theoretical and empirical relations for Re, Pr, Nu, heat transfer coefficient and their estimation (if relevant)
3. ANSYS DesignModeler – creation of model, boundary conditions, areas of fluid flow
4. ANSYS Meshing - cross-linking (inflation by compression, sweep method, number of cells less than 500 000)
5. ANSYS Fluent –
* Start ANSYS Fluent, use parallel calculation, check the following parameters: units and area dimensions, number of cells.
* Mesh display including boundary conditions, control.
* Define model, materials, boundary conditions.
* Initialization, calculation.
* Display of Residuals.
* Create iso-surfaces to display velocity, static pressure, velocity, temperature, effective viscosity, XY graph heat flow through the wall, set temperature and dimension reference values, heat transfer coefficient, Nusselt number.
* Comparison of CFD simulation results and estimation.
* Conclusion.

**Write elaborate in Word, a maximum of 20 pages.**

Students will forward the program together with the ANSYS solution Fluentu2019 R3 (ie. Workbench) electronic by email to doc. Ing. Marian Bojka, Ph.D. (marian.bojko@vsb.cz). The Workbench itself is likely to exceed mail size. For example, use [www.uschovna.cz](http://www.uschovna.cz).

Delivery date 3.4.2020. You will be kept informed about the progress of the course.