**Table 5.1** Course specification to doctoral study programs

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| **Course name: Applied numerical methods for engineers** |
| **Teacher or teachers**[**: Đorđe R. Đorđević**](../P%209.3%20Knjiga%20Nastavnika%20DOS%20He/6.%20Djordje%20R.%20Djordjevic%2C%20redovni%20profesor.xlsx)**,** [**Petar V. Protić**](../P%209.3%20Knjiga%20Nastavnika%20DOS%20He/31.%20Petar%20V.%20Protic%2C%20redovni%20profesor.xlsx) |
| **Course status:** Elective |
| **Number of ECTS:** 10 |
| **Precondition courses:** None |
| **Educational goal**Mastering of numerical methods necessary for production of contemporary mathematical models of hydraulic structures and systems as well as calculation procedures for support of experimental measuring in the field and laboratory. Acquainting with the existing numerical software and software realization of the mastered methods in various software languages and tools, with a special focus on programming, using Internet services. |
| **Educational outcomes** Building students capacity to independently produce various mathematical and numerical models of various engineering systems with software realization, and creation of individual and group projects in the routine and research designing, in particular by using the internet services. The research projects should be supported by the realized software. |
| **Course content*** Errors, accuracy, stability of computing designs. Overview of numerical software.
* The systems of linear algebraic equations: direct methods.
* The systems of linear algebraic equations: iterative methods
* Own value problems, calculations of dynamic systems.
* Non-linear equations and systems of equations.
* Finite difference calculation, function interpolation.
* Function approximation.
* Numerical differencing and integration.
* Common differential equations – ODE
* Partial differential equations – PDE
* Integral equations
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| **Literature**1. G.V. Milovanović, Dj. R. Djordjević: Numerical Methods in Computational Engineering, University of Niš, Faculty of Civil Engineering and Architecture, WUS Austria, Niš, 2007. |
| **Number of active teaching classes (weekly)** | Lectures: 4 | Study research work: 0 |
| **Teaching methods**Each students chooses the field of research for production of the project (case-study) at the beginning of the course. The research is realized throughout the course and through homework. The program languages (classic and OOP) are chosen by the candidate according to the own preferences. Consultations and group work (team design and remote designing) will be realized using the Internet services. |
| **Knowledge evaluation (maximum 100 points)****Pre-examination obligations Points Final exam Points**Lecture attendance **10**  Oral part of the exam **30**Colloquium exam **30**Term paper **20** Homework **10** |