## 1.3. Module/ course form

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| To be completed by Course Team | Module name : **Computer Methods In Structural Mechanics** | Module code: |
| Course name: **Computer Methods In Structural Mechanics** | Course code: |
| Faculty:**Institute of Technology** |
| Field of study:**Civil Engineering** |
| Mode of study :**Stationary** | Learning profile:**General academic** | Speciality: **none** |
| Year/ semester:**III / V** | Module/ course status:**Elective** | Module/ course language:**English** |
| Type of classes | lecture | lessons | lab | project | tutorial | other (please specify) |
| Course load  |  |  |  |  | **30** |  |

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| Module/ course coordinator  | civ. eng. Piotr Srokosz, PhD |
| Lecturer | civ. eng. Piotr Srokosz, PhD |
| Module/ course objectives | Mastering students the principles of the finite element method applied to practical problems of structural mechanics |
| Entry requirements  | Theoretical foundations of numerical methods for solving basic boundary problems in structural mechanics |

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| **LEARNING OUTCOME** |
| Nr | LEARNING OUTCOME DESCRIPTION | Learning outcome reference |
|  | **Knowledge** |  |
| 1 | student knows the rules of creation of the equations of the finite element method applied to rod systems | K\_W04 |
| 2 | student knows the basic rules of operating schemes based on the finite element method | K\_W09 |
|  | **Skills** |  |
| 3 | student is able to explain the concept of the finite element method applied to selected rod systems | K\_U04 |
| 4 | student can create the system of equations of the finite element method by introducing support conditions occurring in the analyzed rod system | K\_U04 |
| 5 | student can create the symbolic form of the stiffness matrix for rod system composed of different elements | K\_U05 |
|  | **Social competences** |  |
| 6 | student is able to work in a group, student is able to organize work in a team | K1P\_K03 |

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| **CURRICULUM CONTENTS** |
| **Lecture** |
| none |
| Tutorial |
| Presentation of the idea of solution of statically undeterminable systems using the finite element method. Determination of displacements and internal forces in systems containing: spring elements, linear bar elements with constant and variable stiffness, plane truss elements, beam elements, plane frame elements. Determination of displacements, strains and stresses in 2D systems concerning plane stress and plane strain states. |

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| Basic literature | Kattan P.I., Matlab guide to finite elements. An interactive approach, Springer, 2002 |
| Additional literature | Smith I.M., Griffiths D.V., Programming the Finite Element Method, Wiley, 2004 |

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| Teaching methods | Solving problems using computing machines. Clarifications and additions in the form of short lectures using a blackboard. Analysis of the results in the form of a discussion. Computational experiments performed individually and in a group. |
| Assessment metod | Learning outcome number |
| Written short tests | 4, 5 |
| Written final test | 3, 4, 5 |
| Work in a team and oral answers | 6 |
| Individual work and oral answers | 1, 2 |
| Form and terms of an exam | Credit with a grade.1 written test (50%), activity in the class with oral answers (25%), 2 written short tests (25%) |

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| **STUDENT WORKLOAD** |
|  | Number of hours |
| Participation in lectures | - |
| Independent study of lecture topics | - |
| Participation in tutorials, labs, projects and seminars | 30 |
| Independent preparation for tutorials\* | 15 |
| Preparation of projects/essays/etc. \* | - |
| Preparation/ independent study for exams | 4 |
| Participation during consultation hours | 1 |
| Other | - |
| **TOTAL student workload in hours** | 50 |
| **Number of ECTS credit per course unit** | **2** |
| Number of ECTS credit associated with practical classes | **-** |
| Number of ECTS for classes that require direct participation of professors | (30h+1h=31h)31h/25h=**1.24** |