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| **Institute of Applied Mathematics**  | Semester 1. of the curriculum 2023-24-1  |
| Name of the subject:  | Code of the subject:  | Credits:  | Weekly hours:  |
|   | lec  | sem  | lab  |
| **Geometry and topology**  | NMXGT1EMNF  | 4  | full-time  | 2  | 1  | 0  |
| Responsible person for the subject: Prof. Dr. NAGY Péter Tibor  | Classification: professor emeritus  |
| Subject lecturer(s):   |
| Prerequisites:  |   |   |
| Way of the assessment:  | exam  |   |   |
| **Course description**  |
| Goal:  | Acquisition of geometric, differential geometric and topological knowledge required for geometric modelling.  |
| Course description:  | Isometries of the Euclidean plane and space. The geometry of the sphere, elliptic plane, projective plane, hyperbolic plane. Euler polyhedron theorem, regular polyhedra. Topology of surfaces, Euler characteristic. Differentiable curves, curvature and torsion. Topological and metric spaces, sequences and convergence, compactness and connectedness.  |
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| **Lecture schedule**  |
| Education week  | Topic  |
| 1.  | Isometries of the Euclidean plane. Classification.  |
| 2.  | Isometries of the Euclidean space. Classification.  |
| 3.  | Geometry of the sphere, elliptic plane.  |
| 4.  | Projective plane, Beltrami–Klein and Poincaré disk model of hyperbolic plane.  |
| 5.  | Euler polyhedron theorem, Euler characteristic.  |
| 6.  | Regular polyhedral, constructions and classification.  |
| 7.  | 1st midterm  |
| 8.  | Differentiable curves, curvature.  |
| 9.  | Torsion, Frenet equations.  |
| 10.  | Topological and metric spaces.  |
| 11.  | Sequences and convergence.  |
| 12.  | Compactness and connectedness  |
| 13.  | 2nd midterm  |
| 14.  | Summary, evaluation  |
| **Mid-term requirements**  |
| Conditions for obtaining a mid-term grade/signature  | 50% of home assignments  |
| **Assessment schedule**  |
| **Education week**  | Topic  |
| **7**  | 1st midterm: 1-6 weeks   |
| **13**  | 2nd midterm: 8-12 weeks   |
| **14**  | test retake  |
| **Method used to calculate the *mid-term grade*** (to be filled out only for subjects with mid-term grades)  |
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| **Type of the replacement**  |
| Type of the replacement of written test/mid-term grade/signature  | Written exam  |
| **Type of the exam** (to be filled out only for subjects with exams)  |
| Written and oral exam  |
| **Calculation of the exam mark** (to be filled only for subjects with exams)  |
| 70% written exam + 30% oral exam  |
| **​​Final grade calculation methods:​**  |
| 0-50: fail (1) 51-62: pass (2) 63-75: satisfactory (3) 76-88: good (4) 89-100: excellent (5)  |
| **References**  |
| Obligatory:  | Audin, Michèle; Geometry, Universitext, Springer, 2003.  |
| Recommended:  | Coxeter, H.S.M.; Introduction to Geometry, Wiley, 1969.  Hoffmann Miklós: Topology and differential geometry, <https://dtk.tankonyvtar.hu/xmlui/handle/123456789/8413>  |
| Other references:  |   |