Module Title **Asymptotic Methods in Mechanics**	Credits (ECTS) **6**	**AMM**
Module Overseer: **Ivan Argatov**		**Email:** ivan.argatov@gmail.com
Module Description		

1. Course Goals

In-depth study by students of asymptotic methods used to solve various problems in mechanics, physics and engineering. Skills to develop specific mathematical models of mechanical processes and phenomena, their analytical implementation, and analysis of results of asymptotic modeling.

Competencies provided by module (%)
specialized knowledge 60 methodological competence **35**
system knowledge **5** social competence **0**

2. Contents

Operations with asymptotic expansions; Perturbation methods for algebraic equations with small parameter; Regular and singular perturbation methods for ordinary differential equations; Regular perturbation methods for boundary problems with partial differential equations; Matched asymptotic expansions: outer solutions, inner solutions; Van Dyke's matching rule and composite approximations; Method of strained coordinates; Method of multiple scales.

3. Literature

Are printed scripts available? yes √, no □
Are electronic scripts available? yes √, no □

Literature:

1. Argatov, I., Mishuris, G., 2011. Asymptotic Methods in Mechanics. Aberystwyth University. 122 pp. (in English; Electronic Edition) http://fp7.imaps.aber.ac.uk/oa_data/lecture_notes/Asymptotic_methods_in_mechanics.pdf
2. Hinch, E.J., 1991. Perturbation Methods. Cambridge Texts in Applied Mathematics. Cambridge University Press, Cambridge.
3. Nayfeh, A.H., 2000. Perturbation Methods, John Wiley and Sons, New York.
4. Kevorkian, J., Cole, J.D., 1981. Perturbation methods in Applied Mathematics. Springer-Verlag, New York.
5. White, R.B., 2006. Asymptotic Analysis of Differential Equations. Imperial College Press & World Scientific, London.

4. Courses

Course Title	Classroom Format	Number of hours	ECTS credits	Language	Semester (WS / SS) Winter or Summer
1. Asymptotic Methods in Mechanics	Lecture Lab	30 30	6	English	WS

5. Teaching Format

Lecture, practical training with the use of multimedia equipment

6. Prerequisites
a) obligatory: knowledge of mechanics and higher mathematics, possession of basic knowledge of mathematical models of physical phenomena (Nonlinear oscillations, Heat-conduction) b) desirable: elements of mathematical physics and analytical methods

7. Workload and Credits
Participation in lectures/classes: 60 h Private study: 60 h Tests and examination preparation: 60 h Total: 180 h LP: 6

8. Examination Format
Oral or written test/exam

9. Module Duration
Achievable in 1 semester

10. Number of Students
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11. Course Registration
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