



Univerza v Mariboru

Fakulteta za naravoslovje  
in matematiko

### UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

<b>Predmet:</b>	Pogonska tehnika
<b>Subject Title:</b>	Driving technique

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Tehnika – področje izobraževanja, 3. stopnja		2	zimski/poletni ali
		3	poletni
Education in Engineering, 3 <sup>rd</sup> cycle		2	winter/summer or
		3	summer

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
10	5				75	3

Nosilec predmeta / Lecturer:

Matjaž Šraml

Jeziki /

Languages:

Predavanja / Lecture: Slovenščina / Slovene

Vaje / Tutorial:

Pogoji za opravljanje študijskih obveznosti:

Osnove tehnike, Fizika

Prerequisites:

Basic of technique, Physics

Vsebina:

Uvodna poglavja: Pogonska sila, pogonska moč. Pogonski stroji. Prenosniki moči. Upori gibanja (kolo v gibanju, zračni upor, gravitacijski upor) – za vse vrste transportnih naprav.  
Pogonska tehnika: Zgodovinski razvoj; mehanika pogona; motorji z notranjim zgorevanjem; elektromotorji, pnevmatski in hidro motorji.  
Alternativni viri energije pogonskih strojev (hibridni pogoni, gorivna celica itd.).  
Osnovni mehanizmi pogonske tehnike: sklopke, menjalniki, diferencial, mehanizem za upravljanje.  
Zavorni mehanizmi: vrste in principi delovanja.  
Prednosti in slabosti vzdrževanja posameznih pogonov.  
Prihodnost v razvoju pogonske tehnike  
Ekološki vidik pogonskih sistemov (emisija, razgradnja itd.).

Temeljni literatura in viri / Textbooks:

Content (Syllabus outline):

Introduction: Driving force, driving power. Driving machines. Power transmission. Movement resistance (movement of wheel, air resistance, gravity resistance) - for all kinds of transport devices.  
Driving technique: History, mechanics of driving, engines with inner combustion, electromotor, pneumatic and hydro motors.  
Alternative energy sources of driving engines (hybrid drive, fuel cell etc.).  
Basic mechanisms of driving technique: clutches, transmission gear, differential, mechanism for driving control.  
Brakes: types and basic working principles  
Advantages and drawbacks of maintenance of different driving mechanisms.  
Future of driving technique  
Ecological aspects of driving systems (emission, recycling etc.).

1. Šraml M.: VLEKA IN TRANSPORTNA SREDSTVA, Zapiski predavanj, Univerza v Mariboru, 2007.
2. Crouse H. W.: AUTOMOTIVE MECHANICS, 5<sup>th</sup> edition.
3. Bohner M. et al.: MOTORNO VOZILO, Tehniška založba Slovenije, 1996.
4. Spletni viri (navedeni v 1. viru)

### Cilji:

Študenta poglobljeno seznaniti s principi delovanja, uporabnostjo in najnovejšimi pogonskimi tehnikami, ki se ali se bodo uporabljale v transportnih napravah.

### Objectives:

To introduce all details of basic principles of operating, applicability and state of the art of driving techniques, which are and will be in use at transport devices.

### Predvideni študijski rezultati:

#### Znanje in razumevanje:

S prejetim znanjem bo študent:

- nadgradil osnovne principe delovanja in lastnosti pogonskih sistemov;
- razumel lastnosti in medsebojne odvisnosti pogonskih sistemov v odnosu do okolja in uporabnikov;
- znal metodološko znanstven-raziskovalno pristopiti k reševanju in analizi pogonskih sistemov in njih novitet.

#### Prenesljive/ključne spretnosti in drugi atributi:

*Spretnosti komuniciranja:* ustni zagovor laboratorijskih vaj, javna predstavitev seminarskega dela, pisno izražanje pri izpitu.

*Uporaba informacijske tehnologije:* uporaba programskih orodij za pripravo simulacijskih in animacijskih modelov principov delovanja, iskanje informacij na svetovnem spletu in drugi raziskovalni literaturi.

*Reševanje problemov:* kakšni pogoni so primerni za posamezne transportne sisteme (vozila, naprave, ...).

*Delo v skupini:* skupinsko delo pri seminarju in laboratorijskih vajah.

### Intended learning outcomes:

#### Knowledge and understanding:

Student with absolved knowledge will:

- upgrade the knowledge how works driving system and their basic properties;
- understand properties and relationship between driving mechanisms, related to environment and users;
- be able in methodological scientific-research way to deal with solving and analyze driving systems and all recent technological aspects.

#### Transferable/Key Skills and other attributes:

*Communication skills:* oral lab work defence, public presentation of seminary work, manner of expression at written examination.

*Use of information technology:* use of programming tools for making of simulation and animation models of basic working principles, searching for information on the web and other research literatures.

*Problem solving:* which driving mechanisms are suitable for particular transport systems (vehicles, devices...).

*Working in a group:* group work at the seminar and lab work.

### Metode poučevanja in učenja:

- predavanja
- dialog
- seminarsko delo v skupini
- reševanje domačih nalog
- praktično delo na vajah

### Teaching and learning methods:

- lectures
- dialogue
- seminar team work
- coursework,
- practical laboratory work

### Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

- seminarska naloga
- pisni izpit,
- ustni izpit.

Delež (v %) /  
Weight (in %)

30  
30  
40

### Assessment methods:

Type (examination, oral, coursework, project):

- seminar work
- written examination,
- oral examination.

### Reference nosilca / Lecturer's references:

- Aktivni član SIST za področje Transportnih naprav.
- Gostujoči profesor na Univerzi v Hasseltu, Belgija in Univerzi v Novem Sadu, Srbija.
- ŠRAML, Matjaž. *Transportna sredstva (v prometu) = TSvP*. Maribor: Fakulteta za gradbeništvo, 2008. 205 str., graf. prikazi.  
<http://moodle.uni-mb.si/mod/resource/view.php?inpopup=true&id=11755>.

- PEVEC, Miha, ODER, Grega, POTRČ, Iztok, ŠRAML, Matjaž. Elevated temperature low cycle fatigue of grey cast iron used for automotive brake discs. *Engineering failure analysis*, ISSN 1350-6307. [Print ed.], In Press, Accepted Manuscript 2014, str. 1-21. <http://dx.doi.org/10.1016/j.engfailanal.2014.03.021>, doi: [10.1016/j.engfailanal.2014.03.021](https://doi.org/10.1016/j.engfailanal.2014.03.021).
- ODER, Grega, PEVEC, Miha, ŠRAML, Matjaž, POTRČ, Iztok. Thermo mechanical analysis of the railway brake disc system. V: EuroBrake 2012, 15-17 April, Internationales Congress Centre Dresden, Germany. *Proceedings*. London: FISITA (UK), 2012.
- PEVEC, Miha, VRANEŠEVIĆ, Darko, ODER, Grega, POTRČ, Iztok, ŠRAML, Matjaž. Analysis of thermal and deformation behaviour of the passenger car front brake disc. V: EuroBrake 2012, 15-17 April, Internationales Congress Centre Dresden, Germany. *Proceedings*. London: FISITA (UK), 2012.