

Course description

Course abbreviation:	KTO/PNCSA	Page:	1 / 4
Course name:	NC-Machine Tool Programming		
Academic Year:	2023/2024	Printed:	03.06.2024 07:10

Department/Unit /	KTO / PNCSA			Academic Year	2023/2024
Title	NC-Machine Tool Programming			Type of completion	Exam
Accredited/Credits	Yes, 6 Cred.			Type of completion	Combined
Number of hours	Lecture 3 [Hours/Week] Tutorial 3 [Hours/Week]				
Occ/max	Status A	Status B	Status C	Course credit prior to	YES
Summer semester	0 / -	0 / -	0 / -	Counted into average	YES
Winter semester	0 / -	0 / -	4 / -	Min. (B+C) students	10
Timetable	Yes			Repeated registration	NO
Language of instruction	English			Semester taught	Winter semester
Optional course	Yes			Internship duration	0
Evaluation scale	1 2 3 4			Ev. sc. – cred.	S N
No. of hours of on-premise					
Auto acc. of credit	Yes in the case of a previous evaluation 4 nebo nic.				
Periodicity	K				
Substituted course	None				
Preclusive courses	KTO/PNCS				
Prerequisite courses	N/A				
Informally recommended courses	KTO/AVP				
Courses depending on this Course	N/A				

Course objectives:

To understand the systems for programming NC machine tools, know how to use CAM systems to create NC programs, to become acquainted with the possibilities of using cycles, subroutines and parametric programming.

Requirements on student

Class credit:

Processing and defence of a semester work

Time limit for submission: before 15.1. of actual academic year

Examination:

Practical part - processing of a NC program of a given part

Oral part - 2 questions

Content

1. Control system SINUMERIK 810T/M description. NC programming. Demonstration of NC program use at education lathe EMCO PC TURN 120
2. Description and demonstration of NC program use at education milling machine EMCO PC MILL 100
3. KOVOPROG, partprogram framework, geometry - semestral task engage
4. demonstration of partprogram design - language Kovoprogram, basic regime operations
5. SolidCAM, modeling, import of graphics data from another system, NC technology design, postprocessors
6. CAD/CAM system SolidCAM -basic information, operations, demonstration of modeling, NC, simulation and NC technology design.
7. Separate work by semestral task solving

Fields of study

viz PORTÁL ZČU - Courseware

Guarantors and lecturers

- **Guarantors:** Ing. Jan Hnátík, Ph.D. (100%)
- **Lecturer:** Ing. Jan Hnátík, Ph.D. (100%)
- **Tutorial lecturer:** Ing. Jan Hnátík, Ph.D. (100%)

Literature

- **Basic:** Lynch, M. *Computer Numerical Control, Advanced Techniques*. McGraw-Hill, Inc. New York St. Luis, 1992. ISBN 0-07-039224-2.
- **Recommended:** *AlphaCAM ? Reference Manual*.
- **Recommended:** *ASM Handbook, Vol. 16: Machining*. Ohio, 1999. ISBN 0871700077.
- **Recommended:** *CATIA ? Reference Manual*.
- **Recommended:** JANDEČKA, K. *Error Size of the Helix (screw) Groove by Grinding*. Springdale Lane, Millersville, U.S.A., 2012. ISBN 978-3-03785-297-2.
- **Recommended:** Náprstková, Nataša; Janděčka, Karel. *Programování výrobních strojů*. 1. vyd. Ústí nad Labem : Univerzita J.E. Purkyně v Ústí nad Labem, 2010. ISBN 978-80-7414-216-1.

Time requirements**All forms of study**

Activities	Time requirements for activity [h]
Contact hours	26
Graduate study programme term essay (40-50)	40
Preparation for an examination (30-60)	40
Practical training (number of hours)	39
Total:	145

assessment methods**Knowledge - knowledge achieved by taking this course are verified by the following means:**

- Seminar work
- Practical exam
- create a machining strategy
- explain the selected machining strategy

Skills - skills achieved by taking this course are verified by the following means:

- Seminar work
- Practical exam
- program the proposed strategy in the CAM system
- generate NC programs and setup sheet

Competences - competence achieved by taking this course are verified by the following means:

- Seminar work
- Practical exam
- to suggest machining technology in general for complex parts

prerequisite**Knowledge - students are expected to possess the following knowledge before the course commences to finish it successfully:**

to explain the concepts of engineering technology, especially machining technology

to explain terms from analytical geometry

to explain the basic principles of manual NC programming

To understand the systems for programming NC machine tools, know how to use CAM systems to create NC programs, to become acquainted with the possibilities of using cycles, subroutines and parametric programming.

Skills - students are expected to possess the following skills before the course commences to finish it successfully:

to apply the knowledge of mathematics, especially in the field of analytical geometry

to compile a simple NC program in ISO code

to set up the manufacturing process

Competences - students are expected to possess the following competences before the course commences to finish it successfully:

N/A

to use practically knowledge from the field of analytical geometry

to create NC programs for simple parts

teaching methods

Knowledge - the following training methods are used to achieve the required knowledge:

Lecture

Practicum

Multimedia supported teaching

Task-based study method

Project-based instruction

General description of technology creation for NC machines

Skills - the following training methods are used to achieve the required skills:

Individual study

One-to-One tutorial

Task-based study method

Multimedia supported teaching

Project-based instruction

Practicing the creation of NC programs on specified components

Competences - the following training methods are used to achieve the required competences:

Practicum

Lecture

Project-based instruction

Task-based study method

Multimedia supported teaching

Elaboration of individual projects - technology design

learning outcomes

Knowledge - knowledge resulting from the course:

to clarify the possibilities of building the NC program manually, with the help of workshop programming systems and / or automatically

to explain basic machining strategies of NC machining

to explain the meaning of cycles and parametric programming

Skills - skills resulting from the course:

to compile the NC program manually, with the help of workshop programming or automatically with PC support

to compile a NC program using cycles and parameterization

to use NC machining strategies in CAM systems

Competences - competences resulting from the course:

N/A

N/A

use modern CAD / CAM systems

create NC programs for complex parts

Course is included in study programmes:

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Design of Power Machines and Equipment	Postgraduate Master	Full-time	Digital Manufacturing	1	2021	2023	Povinně volitelné předměty 1. roč. ZS	B	1	ZS
Design of Power Machines and Equipment	Postgraduate Master	Full-time	Manufacturing Machines and Technologies	1	2021	2023	Povinně volitelné předměty 1. roč. ZS	B	1	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Combined	Design Engineering of Manufacturing Machines and Equipment	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Full-time	Design Engineering of Manufacturing Machines and Equipment	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Full-time	Design Engineering of Vehicles and Handling Machinery	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Design Engineering of Machines and Technical Devices	Postgraduate Master	Combined	Design Engineering of Vehicles and Handling Machinery	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Design of Power Machines and Equipment	Postgraduate Master	Full-time	Design of Power Machines and Equipment	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Industrial Engineering and Management	Postgraduate Master	Full-time	Industrial Engineering and Management	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Industrial Engineering and Management	Postgraduate Master	Combined	Industrial Engineering and Management	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Machining, Additive Technology and Quality Assurance	Postgraduate Master	Full-time	Machining, Additive Technology and Quality Assurance	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Materials Science and Manufacturing Technology	Postgraduate Master	Combined	Materials Science and Manufacturing Technology	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS
Materials Science and Manufacturing Technology	Postgraduate Master	Full-time	Materials Science and Manufacturing Technology	1	2020	2023	Doporučené výběrové předměty v AJ	C	2	ZS