

## Course description

<b>Course abbreviation:</b>	KTO/PNCS	<b>Page:</b>	1 / 4
<b>Course name:</b>	NC Machine-Tool Programming		
<b>Academic Year:</b>	2023/2024	<b>Printed:</b>	03.06.2024 08:04

<b>Department/Unit /</b>	KTO / PNCS			<b>Academic Year</b>	2023/2024
<b>Title</b>	NC Machine-Tool Programming			<b>Type of completion</b>	Exam
<b>Accredited/Credits</b>	Yes, 6 Cred.			<b>Type of completion</b>	Combined
<b>Number of hours</b>	Lecture 2 [Hours/Week] Tutorial 3 [Hours/Week]				
<b>Occ/max</b>	Status A	Status B	Status C	<b>Course credit prior to</b>	YES
<b>Summer semester</b>	0 / -	0 / -	0 / -	<b>Counted into average</b>	YES
<b>Winter semester</b>	13 / -	0 / -	1 / -	<b>Min. (B+C) students</b>	7
<b>Timetable</b>	Yes			<b>Repeated registration</b>	NO
<b>Language of instruction</b>	Czech			<b>Semester taught</b>	Winter semester
<b>Optional course</b>	Yes			<b>Internship duration</b>	0
<b>Evaluation scale</b>	1 2 3 4			<b>Ev. sc. – cred.</b>	S N
<b>No. of hours of on-premise</b>					
<b>Auto acc. of credit</b>	Yes in the case of a previous evaluation 4 nebo nic.				
<b>Periodicity</b>	K				
<b>Substituted course</b>	None				
<b>Preclusive courses</b>	KTO/PNCK and KTO/PNCK*				
<b>Prerequisite courses</b>	N/A				
<b>Informally recommended courses</b>	KTO/AVP* or KTO/PATP				
<b>Courses depending on this Course</b>	KTO/ZSZT3, KTO/ZSZT4, KTO/ZSZT5				

### 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

Vytvořena skupina v MS Teams, která slouží pro online výuku. Skupina obsahuje i podklady v elektronické formě.

**Guarantors and lecturers**

- **Guarantors:** Ing. Jan Hnátík, Ph.D. (100%)
- **Lecturer:** Ing. Jan Hnátík, Ph.D. (50%), Ing. Aneta Jirásko, Ph.D. (100%), Ing. Jiří Vyšata, Ph.D. (100%)
- **Tutorial lecturer:** Ing. Jan Hnátík, Ph.D. (50%), Ing. Aneta Jirásko, Ph.D. (100%), Ing. Jiří Vyšata, Ph.D. (100%)

**Literature**

- **Basic:** Vrabec, M., Mádl, J. *NC programování v obrábění*. Praha, ČVUT, 2004. ISBN 80-01-03045-8.
- **Basic:** Janděčka, Karel; Kožmin, Pavel; Česánek, Jiří. *Programování NC strojů*. V Plzni : Západočeská univerzita, 2000. ISBN 80-7082-692-4.
- **Extending:** Peška J.-Brtna, Z. *KOVOPROG, uživatelská příručka*. Tábor, 1993.
- **Extending:** Janděčka, Karel. *Úvod k broušení tvarově složitých nástrojů I*. Vyd. 1. Brno : UJEP, Fakulta výrobních technologií a managementu, 2009. ISBN 978-80-7414-231-4.
- **Recommended:** POLZER, Aleš. *Akademie CNC obrábění*. 2012.
- **Recommended:** 2. KARPUSCHEWSKI, B., JANDEČKA, K.; MOUREK, D. *Automatic Search for Wheel Position in Flute Grinding of Cutting Tools*. CIRP, Imprint: ELSEVIER, 2011.
- **Recommended:** Sova, František. *Automatizace výrobních procesů : návody na cvičení*. 1. vyd. Plzeň : VŠSE, 1982.
- **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:** NC techniky a DP (HNÁTÍK, Jan)
- **Recommended:** Hnátík, Jan. *NC technologie - praktická část*. [Plzeň] : SmartMotion, 2013. ISBN 978-80-87539-29-3.
- **Recommended:** Hnátík, Jan. *NC technologie - teoretická část*. [Plzeň] : SmartMotion, 2013. ISBN 978-80-87539-28-6.
- **Recommended:** Sova F. *Programování NC strojů, učební text postgraduálního kurzu*. Plzeň, 1990.
- **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.
- **Recommended:** Janděčka, Karel. *Využití moderních CAD/CAM systémů při programování NC strojů*. Plzeň : Západočeská univerzita, 1996. ISBN 80-7082-260-0.

**Time requirements****All forms of study**

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

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

- Combined exam
- Seminar work

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

- Combined exam
- Seminar work

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

Combined exam  
Seminar work

**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

**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

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

Lecture  
Practicum  
Lecture with visual aids  
Project-based instruction  
Task-based study method  
Multimedia supported teaching  
E-learning

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

Individual study  
One-to-One tutorial  
Lecture with visual aids  
Project-based instruction  
Task-based study method  
Multimedia supported teaching  
E-learning

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

Individual study  
Task-based study method  
Lecture with visual aids  
Project-based instruction  
Multimedia supported teaching  
E-learning

**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

**Course is included in study programmes:**

Study Programme	Type of	Form of	Branch	Stage	St. plan v.	Year	Block	Status	R.year	R.
Machining, Additive Technology and Quality Assurance	Postgraduate Master	Full-time	Machining, Additive Technology and Quality Assurance	1	2020	2023	Compulsory courses	A	1	ZS