

PROGRAMME OF EDUCATION

FACULTY: MECHANICAL AND POWER ENGINEERING

MAIN FIELD OF STUDY: MECHANICAL ENGINEERING AND MACHINE BUILDING

in area of technical science

EDUCATION LEVEL: 2nd level, Master of Science

FORM OF STUDIES: part-time

PROFILE: general academic

SPECIALIZATION: **ENGINEERING OF AVIATION**

LANGUAGE OF STUDY: polish

Content:

1. Assumed educational effects – attachment no. 1
2. Programme of studies – attachment no. 2

Faculty Council Resolution of 30.09.2015

In effect since 01.10.2015

PROGRAMME OF STUDIES**1. Description**

| | |
|--|---|
| <i>Number of semesters:</i> 4 | <i>Number ECTS points necessary to obtain qualifications:</i> 120 |
| <p><i>Prerequisites (particularly for second-level studies):</i> qualifications and competence of engineering degree and to continue education in college the second degree: knowledge of mathematics, physics and chemistry, enabling understanding of the fundamentals of mechanics, materials and principles of construction machinery, knowledge of mechanics, strength of materials and construction of foundations, enabling the understanding and design of the basic machine components, the ability to use to formulate and solve engineering tasks analytical methods, simulation and experimental knowledge of fluid flow including all thermal processes, knowledge of the record structure using 2D and 3D CAD, the ability to communicate in English and the presentation and documentation of the experiment, and the presentation and documentation of the tasks of a project</p> | <p><i>Upon completion of studies graduate obtains</i> <i>professional degree of:</i> Master of Science 2nd level qualifications</p> |
| <p><i>Possibility of continuing studies:</i> 3rd level doctoral studies</p> | <p><i>Graduate profile, employability:</i> Graduates have the knowledge and skills in the following areas: engineering, design, manufacture and operation of machines and manufacturing systems and environmental technologies and safety. They are ready to use creative methods and technologies supporting the design, manufacture and operation of the equipment and the choice of materials engineering, management and development of production in industrial and process control, research in research institutes, management design companies in the field of construction machinery and technological processes of doing business. They have the necessary knowledge and skills in the design, testing and operation of aircraft with particular emphasis on planning, organization and control of the process of aircraft maintenance, repair and overhaul them. They know a foreign language at level B2 + and a second foreign</p> |

| | |
|--|--|
| | language at A1 or A2. |
| <i>Indicate connection with University's mission and its development strategy:</i> | The programme of education is consistent with the mission of the University in the transfer of knowledge and skills to maintain high quality of education and the development of creative, critical and tolerant personality of students by developing and nurturing a strong sense of academic community based on communication and social rights of students and staff |

2. Fields of science and scientific disciplines to which educational effects apply: technical science

3. Concise analysis of consistency between assumed educational effects and labour market needs:

The expected increase in education provide engineering competencies gained on the first level of education, especially in terms of knowledge and skills, with particular emphasis on creativity in solving specific technical problems. The training program equips graduates with the attributes thus enabling him to adapt to the rapidly changing requirements of the labor market .

4. List of education modules:

4.1. List of obligatory modules:

4.1.1. List of basic sciences modules

4.1.1.1. Mathematics module

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|------------------------------|--|------------------------|-----|-----|----|-----|--|-----------------|------|-----------------------|-------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK classes ¹ | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | MNN0673 | Modelling and Optimization | 0,6 | | | | | K2MBM_W04 | 9 | 60 | 2 | 1 | T | E | | | PD | Ob |
| 2 | MNN0673 | Modelling and Optimization | | 1,8 | | | | K2MBM_U03 | 27 | 90 | 3 | 2,25 | T | Z | | P | PD | Ob |
| Total | | | 0,6 | 1,8 | | | | | 36 | 150 | 5 | 3,25 | | | | | | |

4.1.1.2. Physics module

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|------------------------------|--|------------------------|----|-----|----|-----|--|-----------------|------|-----------------------|-------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK classes ¹ | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | MNN0533 | Mechanics Analytical | 1,8 | | | | | K2MBM_W03 | 27 | 120 | 4 | 2 | T | Z | | | PD | Ob |
| Total | | | 1,8 | | | | | | 27 | 120 | 4 | 2 | | | | | | |

Altogether for basic sciences modules:

| Total number of hours | | | | | Total number of ZZU hours | Total number of CNPS hours | Total number of ECTS points | Number of ECTS points for BK classes ¹ |
|-----------------------|-----|-----|----|-----|---------------------------|----------------------------|-----------------------------|---|
| lec | cl | lab | pr | sem | | | | |
| 2,4 | 1,8 | | | | 63 | 270 | 9 | 5,25 |

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

4.1.2. List of main-field-of-study modules

4.1.2.1. Obligatory main-field-of-study module

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|------------------------------|--|------------------------|----|-----|-----|-----|--|-----------------|------|-----------------------|-------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK classes ¹ | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | MNN0591 | Mechatronics and Control Systems | 1,2 | | | | | K2MBM_W01 | 18 | 120 | 4 | 2 | T | E | | | K | Ob |
| 2 | MNN0591 | Mechatronics and Control Systems | | | 1,2 | | | K2MBM_U01 | 18 | 60 | 2 | 1,5 | T | Z | | P | K | Ob |
| 3 | MNN1383 | Modern Engineering Materials | 0,6 | | | | | K2MBM_W02 | 9 | 30 | 1 | 0,5 | T | Z | | | K | Ob |
| 4 | MNN1383 | Modern Engineering Materials | | | 1,2 | | | K2MBM_U02 | 18 | 60 | 2 | 1,5 | T | Z | | P | K | Ob |
| 5 | MNN1383 | Modern Engineering Materials | | | | 0,6 | | K2MBM_U06 | 9 | 30 | 1 | 0,75 | T | Z | | P | K | Ob |
| 6 | MNN0023 | Failure Analysis of Machine and Devices | 1,2 | | | | | K2MBM_W05 | 18 | 60 | 2 | 1 | T | Z | | | K | Ob |
| 7 | MNN0023 | Failure Analysis of Machine and Devices | | | 0,6 | | | K2MBM_U04 | 9 | 60 | 2 | 1,5 | T | Z | | P | K | Ob |
| 8 | MNN1474 | Integrated Production Systems | 1,2 | | | | | K2MBM_W06 | 18 | 60 | 2 | 1 | T | Z | | | K | Ob |
| 9 | MNN1474 | Integrated Production Systems | | | 1,2 | | | K2MBM_U05 | 18 | 60 | 2 | 1,5 | T | Z | | P | K | Ob |
| 10 | MNN1551 | Diploma Seminar | | | | | 1,2 | K2MBM_U06 K2MBM_U07 K2MBM_K01 K2MBM_K03 K2MBM_K04 K2MBM_K05 | 18 | 60 | 2 | 1,5 | T | Z | | P | K | Ob |
| Total | | | 4,2 | | 4,2 | | 1,8 | | 153 | 600 | 20 | 12,75 | | | | | | |

Altogether (for main-field-of-study modules):

| Total number of hours | | | | | Total number of ZZU hours | Total number of CNPS hours | Total number of ECTS points | Number of ECTS points for BK classes ¹ |
|-----------------------|----|-----|----|-----|---------------------------|----------------------------|-----------------------------|---|
| lec | cl | lab | pr | sem | | | | |
| 4,2 | | 4,2 | | 1,8 | 153 | 600 | 20 | 12,75 |

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course / group of courses – enter O

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

4.2. List of optional modules:

4.2.1. List of general education modules

4.2.1.1. Liberal-managerial subjects module (min. 5 ECTS points):

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|------------------------------|--|------------------------|----|-----|----|-----|--|-----------------|------|-----------------------|-------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK classes ¹ | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | HNN100400BK | Humanities Course | 0,6 | | | | | K2MBM_W07 K2MBM_K02 | 9 | 60 | 2 | 1 | T | Z | O | | KO | W |
| 2 | ZNN100400BK | Management Course | 1,2 | | | | | K2MBM_W08 K2MBM_K05 | 18 | 90 | 3 | 1,5 | T | Z | O | | KO | W |
| Total | | | 1,8 | | | | | | 27 | 150 | 5 | 2,5 | | | | | | |

4.2.1.2. Foreign languages module (min. 3 ECTS points):

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|--|--|------------------------|-----|-----|----|-----|--|-----------------|------|-----------------------|-------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK classes ¹ | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | JZL100589C JZL100846C JZL100847C | Foreign Language (continue) B2+ level | | 0,6 | | | | K2MBM_U08 | 9 | 30 | 1 | 0,75 | T | Z | O | P | KO | W |
| 2 | JZL100586C JZL100591C JZL100597C | Foreign Language (second), any level | | 1,8 | | | | K2MBM_U09 | 27 | 60 | 2 | 1,5 | T | Z | O | P | KO | W |
| Total | | | | 2,4 | | | | | 36 | 90 | 3 | 2,25 | | | | | | |

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

4.2.1.3. Sporting classes module (min. 1 ECTS points):

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-----|------------------------------|--|------------------------|------|-----|----|-----|--|-----------------|------|-----------------------|--------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK class ¹ es | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | WFW020000BK | Sporting Classes | | 0,53 | | | | K2MBM_K06 | 8 | 8 | 1 | 1 | T | Z | O | P | KO | W |
| | | Total | | 0,53 | | | | | 8 | 8 | 1 | 1 | | | | | | |

Altogether for general education modules:

| Total number of hours | | | | | Total number of ZZU hours | Total number of CNPS hours | Total number of ECTS points | Number of ECTS points for BK classes ¹ |
|-----------------------|------|-----|----|-----|---------------------------|----------------------------|-----------------------------|---|
| lec | cl | lab | pr | sem | | | | |
| 1,8 | 2,93 | | | | 71 | 248 | 9 | 5,75 |

4.2.2. List of main-field-of-study modules

4.2.2.1. Individual master of science project module

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-----|------------------------------|--|------------------------|----|-----|------|-----|--|-----------------|------|-----------------------|--------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK class ¹ es | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | MNN1492 | Master Individual Student Project | | | | 5,33 | | K2MBM_U07 K2MBM_K01 K2MBM_K04 K2MBM_K05 | 80 | 240 | 8 | 1 | T | Z | | P | K | W |
| | | Total | | | | 5,33 | | | 80 | 240 | 8 | 1 | | | | | | |

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

4.2.2.2. Master of science diploma dissertation module (min. 20 ECTS points):

| No. | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|------------------------------|--|------------------------|----|-----|----|-----|--|-----------------|------|-----------------------|-------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK classes ¹ | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | MNN1551 | Master Thesis | | | | | | K2MBM_U07 K2MBM_K01 K2MBM_K04 K2MBM_K05 | | 600 | 20 | 4 | T | Z | | P | K | W |
| Total | | | | | | | | | 600 | 20 | 4 | | | | | | | |

Altogether for main-field-of-study modules:

| Total number of hours | | | | | Total number of ZZU hours | Total number of CNPS hours | Total number of ECTS points | Number of ECTS points for BK classes ¹ |
|-----------------------|----|-----|------|-----|---------------------------|----------------------------|-----------------------------|---|
| lec | cl | lab | pr | sem | | | | |
| | | | 5,33 | | 80 | 840 | 28 | 5 |

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z – enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

4.2.3. List of specialization modules

4.2.3.1. Specialization subjects module

| No | Course/group of courses code | Name of course/group of courses (denote group of courses with symbol GK) | Weekly number of hours | | | | | Field-of-study educational effect symbol | Number of hours | | Number of ECTS points | | Form ² of course/group of courses | Way ³ of crediting | Course/group of courses | | | |
|-------|------------------------------|--|------------------------|-----|-----|-----|-----|--|-----------------|------|-----------------------|--------------------------|--|-------------------------------|------------------------------|------------------------|-------------------|-------------------|
| | | | lec | cl | lab | pr | sem | | ZZU | CNPS | total | BK class ¹ es | | | university-wide ⁴ | practical ⁵ | kind ⁶ | type ⁷ |
| 1 | MNN0061 | Structure of Aircrafts | 1,2 | | | | | S2ILO_W02 | 18 | 60 | 2 | 1 | T | Z | | | S | W |
| 2 | MNN0061 | Structure of Aircrafts | | 0,6 | | | | S2ILO_U03 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 3 | MNN1661 | Aircraft Power Systems | 0,6 | | | | | S2ILO_W08 | 9 | 30 | 1 | 0,5 | T | Z | | | S | W |
| 4 | MNN1661 | Aircraft Power Systems | | | | 0,6 | | S2ILO_U04 | 9 | 60 | 2 | 1,5 | T | Z | | P | S | W |
| 5 | MNN0842 | Bases of the Theory of Oscillation | 1,2 | | | | | S2ILO_W03 | 18 | 120 | 4 | 2 | T | E | | | S | W |
| 6 | MNN0842 | Bases of the Theory of Oscillation | | 0,6 | | | | S2ILO_U05 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 7 | MNN0912 | Aviation Law | 0,6 | | | | | S2ILO_W06 | 9 | 30 | 1 | 0,5 | T | Z | | | S | W |
| 8 | MNN0912 | Aviation Law | | | | 0,6 | | S2ILO_U10 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 9 | MNN0952 | Design of Propulsion Units | 1,2 | | | | | S2ILO_W01 | 18 | 120 | 4 | 2 | T | E | | | S | W |
| 10 | MNN0952 | Design of Propulsion Units | | 0,6 | | | | S2ILO_U01 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 11 | MNN0952 | Design of Propulsion Units | | | | 0,6 | | S2ILO_U02 | 9 | 120 | 4 | 3 | T | Z | | P | S | W |
| 12 | MNN1302 | Durability and Reliability of Aircraft | 1,2 | | | | | S2ILO_W07 | 18 | 60 | 2 | 1 | T | Z | | | S | W |
| 13 | MNN1392 | Selected Problems on Fluid Mechanics | 0,6 | | | | | S2ILO_W04 | 9 | 30 | 1 | 0,5 | T | Z | | | S | W |
| 14 | MNN1392 | Selected Problems on Fluid Mechanics | | 0,6 | | | | S2ILO_U06 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 15 | MNN1392 | Selected Problems on Fluid Mechanics | | | 0,6 | | | S2ILO_U07 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 16 | MNN0182 | Flight Dynamics and Aeroelasticity of Aircrafts | 1,2 | | | | | S2ILO_W05 | 18 | 120 | 4 | 2 | T | E | | | S | W |
| 17 | MNN0182 | Flight Dynamics and Aeroelasticity of Aircrafts | | | | 1,2 | | S2ILO_U08 | 18 | 210 | 7 | 5,25 | T | Z | | P | S | W |
| 18 | MNN0552 | Helicopter Flight Mechanics | 1,2 | | | | | S2ILO_W09 | 18 | 60 | 2 | 1 | T | Z | | | S | W |
| 19 | MNN0552 | Helicopter Flight Mechanics | | 0,6 | | | | S2ILO_U11 | 9 | 30 | 1 | 0,75 | T | Z | | P | S | W |
| 20 | MNN0552 | Helicopter Flight Mechanics | | | | 0,6 | | S2ILO_U12 | 9 | 60 | 2 | 1,5 | T | Z | | P | S | W |
| 21 | MNN0602 | Numerical Methods in Design of Constructions | 0,6 | | | | | S2ILO_W11 | 9 | 30 | 1 | 0,5 | T | Z | | | S | W |
| 22 | MNN0602 | Numerical Methods in Design of Constructions | | | | 1,2 | | S2ILO_U09 | 18 | 240 | 8 | 6 | T | Z | | P | S | W |
| 23 | MNN1461 | Safety Management in Aviation | 1,2 | | | | | S2ILO_W10 | 18 | 60 | 2 | 1 | T | Z | | | S | W |
| Total | | | 10,8 | 3 | 0,6 | 4,2 | 0,6 | | 288 | 1620 | 54 | 34,5 | | | | | | |

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z – enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course /group of courses – enter O

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

Altogether for specialization modules:

| Total number of hours | | | | | Total number of ZZU hours | Total number of CNPS hours | Total number of ECTS points | Number of ECTS points for BK classes ¹ |
|-----------------------|----|-----|-----|-----|---------------------------|----------------------------|-----------------------------|---|
| lec | cl | lab | pr | sem | | | | |
| 10,8 | 3 | 0,6 | 4,2 | 0,6 | 288 | 1620 | 54 | 34,5 |

4.3. Diploma dissertation module

| | | |
|---|------------------------------|----------------|
| Type of diploma dissertation | magister | |
| Number of diploma dissertation semesters | Number of ECTS points | Code |
| 1 | 20 | MNN1551 |
| Character of diploma dissertation | | |
| Experimental/project/ literature survey | | |
| Number of BK¹ ECTS points | 4 | |

5. Ways of verifying assumed educational effects

| Type of classes | Ways of verifying assumed educational effects |
|------------------------|--|
| lecture | examination, final test |
| class | progress test, final test, tasks valuating |
| laboratory | pretest, report from laboratory |
| project | project defence |
| seminar | participation in discussion, topic presentation, essay |
| diploma dissertation | prepared diploma dissertation |

6. Total number of ECTS points, which student has to obtain from classes requiring direct academic teacher-student contact (enter total of ECTS points for courses/groups of courses denoted with code BK¹)

63,25 ECTS

7. Total number of ECTS points, which student has to obtain from basic sciences classes

| | |
|---|---|
| Number of ECTS points for obligatory subjects | 9 |
| Number of ECTS points for optional subjects | 0 |
| Total number of ECTS points | 9 |

8. Total number of ECTS points, which student has to obtain from practical classes, including laboratory classes (enter total number of ECTS points for courses/group of courses denoted with code P)

| | |
|--|----------------|
| Number of ECTS points for obligatory subjects including laboratory classes and projects | 14 8 |
| Number of ECTS points for optional subjects including: laboratory classes and projects diploma dissertation | 62 32 20 |
| Total number of ECTS points | 76 |

9. Minimum number of ECTS points, which student has to obtain doing education modules offered as part of university-wide classes or other main field of study (enter number of ECTS points for courses/groups of courses denoted with code OG)
9 ECTS points

10. Total number of ECTS points, which student may obtain doing optional modules (min. 30% of total number of ECTS points)
91 ECTS points (775,8 %)

11. Range of the diploma exam

1. Theoretical problems

- 1.1. Free and constrained systems, constraints, and their classification
- 1.2. Construction and operation of computerized measuring systems
- 1.3. Flatter wings - symptoms, causes, methods of elimination
- 1.4. Divergence of an aircraft wing
- 1.5. Trust of helicopterer rotor with axial flow
- 1.6. Rotor torque reaction
- 1.7. Controllability of the helicopter
- 1.8. Aviation safety measures
- 1.9. Classification of air accidents

- 1.10. Methodology of preliminary gas-dynamic calculations of one flow turbo engines
- 1.11. Methodology of preliminary gas-dynamic calculations of turbofan engines
- 1.12. Methodology of gas-dynamic calculation of compressor, combustor, turbine and exhaust system turbine aircraft engine
- 1.13. Operating parameters of turbine engines determine their performance (including the thermodynamic cycle parameters), the average ranges of their values

2. Construction and technological problems

- 2.1. Analog-digital data acquisition systems
- 2.2. Sensors in data acquisition systems
- 2.3. Buffeting vibration of aircraft structures
- 2.4. Vibration type Shimmy
- 2.5. Construction and operation of an aircraft air conditioning system
- 2.6. Construction and operation of aircraft fuel systems
- 2.7. Construction and operation of aircraft hydraulic systems
- 2.8. The loads acting on the main components of a turbine aircraft engine
- 2.9. Load and strength calculations of guide vanes of fans, compressors and turbines
- 2.10. Load and strength calculations of rotor blades of fans, compressors and turbines
- 2.11. The influence of material temperature and its distribution on the strength calculation of compressors and turbines parts
- 2.12. Load and strength calculations of shafts and carrying discs of turbo engines rotors

3. Operational problems

- 3.1. Development of reliable methods in the design of aircraft
- 3.2. The rules controlling the efficiency of systems: fuel, hydraulic and pneumatic
- 3.3. Methods of air accident investigation
- 3.4. Characteristics of physical phenomena that affect the aging of technical objects
- 3.5. The concept of aircraft durability and vitality
- 3.6. The types of aircraft durability
- 3.7. Issues fatigue strength of aircraft components
- 3.8. Reliability models
- 3.9. Redundant in aircraft construction
- 3.10. Flight Crew Licensing
- 3.11. Rescue flights
- 3.12. Characterization of maintenance aircraft methods

12. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular modules

| <i>No.</i> | <i>Course code</i> | <i>Name of course</i> | <i>Crediting by deadline of... (number of semester)</i> |
|------------|--|--|---|
| | Faculty Council Resolution No 4/D/2008 of 19.09.2008 | The condition for admission the student to the execution of the <i>master thesis</i> module is to pass all subjects in plan of studies in the semester prior to the semester of graduation | |

13. Plan of studies (attachment no. 1)