University of Belgrade

Faculty of Mechanical Engineering

Academic Studies

GUIDE

B.Sc.

M.Sc.

Ph.D.

All study programs are ACCREDITED by
Committee for Accreditation and Quality Verification
of the Republic of Serbia.

Belgrade, May 2008

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МАШИНСКОМ ФАКУЛТЕТУ
УНИВЕРЗИТЕТА У БЕОГРАДУ,
са седиштем у Београду, Краљице Марије 16.

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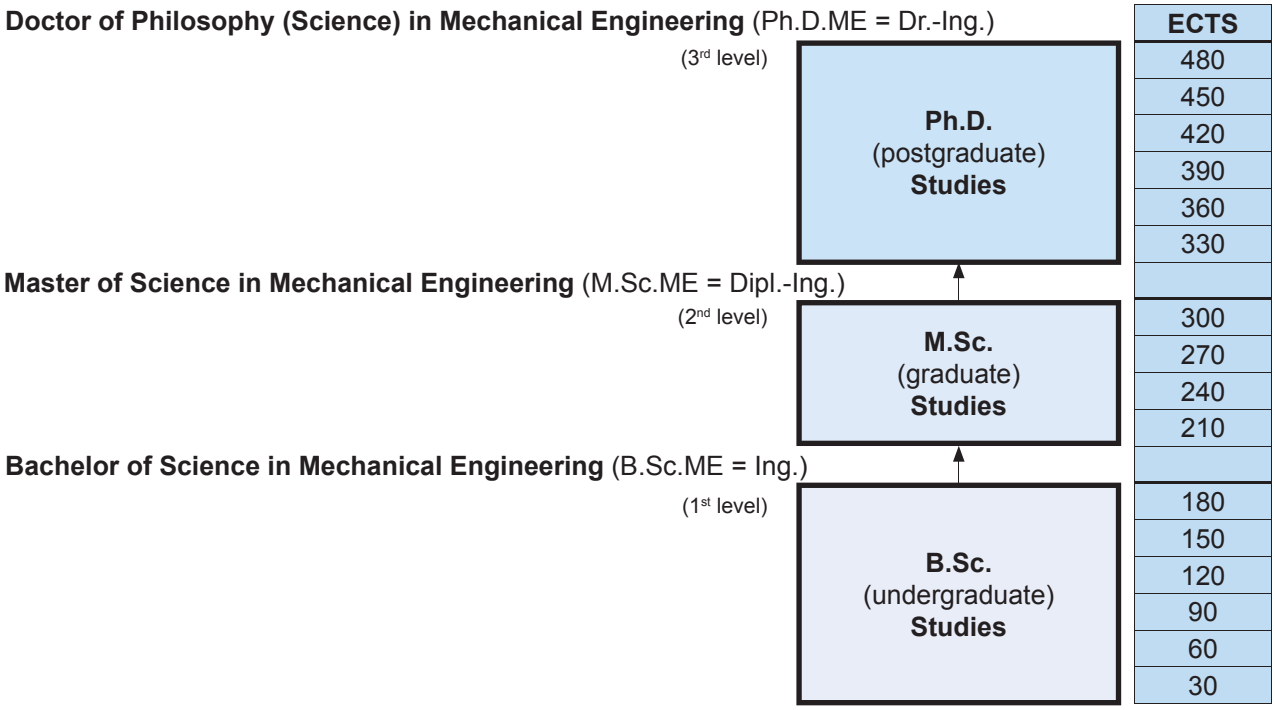
At the University of Belgrade, Faculty of Mechanical Engineering (UB-FME), a new system of studies has been introduced since October 1, 2005:



ACADEMIC (university) studies

In Diploma certificate of B.Sc. studies, the **title: Bachelor of Science (B.Sc.** from the Latin **Baccalaureus Scientiæ**) i**n Mechanical Engineering – three year studies** will be stated. A Diploma Supplement will contain a list of courses the student has attended and passed exams in, and possibly the name of a specialization area when student has earned it by choosing a prescribed group of courses. A student may or may not have a certain specialization area. Abbreviations: B.Sc.ME or BSc ME.

In Diploma certificate of M.Sc. studies, the **title: Master of Science (M.Sc**. from the Latin **Magister Scientiæ**) i**n Mechanical Engineering** (Dipl.-Ing. in Serbian) will be stated. A Diploma Supplement will contain a list of courses the student has attended and passed exams in, as well as the name of the obligatory specialization module from a certain department he/she has taken and completed. Abbreviations: M.Sc.ME or MSc ME.

In Diploma certificate of Ph.D. studies, **the title: Doctor of Philosophy (Science) (Ph.D.** from the Latin **Philosophiæ Doctor) in the field of Mechanical Engineering** will be stated. A Diploma Supplement will contain date of enrollment, specialization area, a list of courses the student has attended and passed exams in, the data on student's teaching experience, papers published and projects' participation, and finally, the date of Ph.D. thesis defense, thesis title, name of the Mentor (Supervisor), and names of Ph.D. committee members. Abbreviations: Ph.D.ME or PhD ME.

Until September 30, 2005, the Faculty studies were integrated in 5 years

Hours weekly	1st year		2nd year		3rd year		4th year		5th year	
	1	2	3	4	5	6	7	8	9	10
5					O	O	O	O	O	
5					O	O	O	O	O	
5				E	O	O	O	O	O	O
5					O	O	O	O	O	
5					O	O	O	O		

The draft is just an orientation since numbers of weekly hours and courses significantly differed through semesters from one specialization (department) to another. Student was obliged to choose specialization area at the start of the 3rd year (designation E, that was the only election he/she ever had!), and then all specialization courses were obligatory (designation O).

Since October 1, 2005, the Faculty has introduced a new system of studies.

Hours weekly	1st year		2nd year		3rd year		4th year		5th year	
	1	2	3	4	5	6	7	8	9	10
5							O	O	O	
5							O	O	O	
5						E	E	O	O	O
5				E	E	E	E	E	E	
5			E		E	E	E	E	E	

Student independently chooses elective courses E, with specialization achieved through obligatory courses O from the module (department) of master's level of studies, and through elective courses from both levels of studies.

University of Belgrade
Faculty of Mechanical Engineering

1st level of studies

B.Sc. (undergraduate) Academic Studies
ECTS 180

Hours weekly	1st year		2nd year		3rd year	
	1st	2nd	3rd	4th	5th	6th
1	Mathematics 1	Mathematics 2	Mathematics 3	Thermodynamics B	Fluid mechanics B	Electrical and electronics engineering
2						
3						
4						
5						
6	Mechanics 1	Basics of strength of constructions	Mechanics 2	Mechanics 3	Numerical methods	Control engineering
7						
8						
9						
10						
11	Constructive geometry and graphics	Engineering graphics	Machine elements 1	Machine elements 2	Manufacturing technology	Elective course 6.3.5
12						
13	Strength of materials					
14						
15						
16	Physics and measurements	Engineering materials 1	Engineering materials 2	Elective course 4.4.5	Elective course 5.4.5	Elective course 6.4.5
17						
18		Basics of sociology and economics				
19						
20						
21	English 1	English 2	Elective course 3.5.5	Mechanical engineering praxis	Elective course 5.5.5	Final course with a report (B.Sc. work) 6.5.5
22						
23	Programming	Computational tools				
24						
25						
				Elective Skill praxis B 4.8		

Legend: white boxes – obligatory (compulsory) courses (subjects), colored boxes – elective courses (subjects). Each course lasts one semester with 5 hours per week, which equals ECTS 6 (ECTS – European Credit Transfer System).

Exceptions: Skill praxis (internship, training, practice) B – minimum 46 hours of student's independent work equals ECTS 1; Mechanical engineering praxis – equals ECTS 5; Final course with a report – as all other courses, but student has to complete a final report (design project or seminar work) and to defend it.

If courses are organized in blocks: a course (block) with 3 teaching hours corresponds to ECTS 4, and a course (block) with 2 teaching hours – to ECTS 2.

Number of exams in the final semestral exam period (January or June) is always 5. However, if with block-courses, then the exam for the first block-course is held earlier, and only the second block is scheduled for the final semestral exam period.

Preliminary coding of the courses is according to their position in the program matrix:

1. the first digit is the number of the semester (vertical, column)
2. the second digit is the number of the full-course box in a semester (horizontal, row)
3. the third digit is the number of weekly hours (full-course 5, large block 3, short block 2)

Rule for introducing block-courses

<table>
<tr><td rowspan="2">Hours weekly</td><td colspan="2">Each year</td><td colspan="2">Each year</td><td></td></tr>
<tr><td>Sem.a</td><td>Sem.b</td><td>Sem.c</td><td>Sem.d</td><td></td></tr>
<tr><td>1</td><td rowspan="5">Full course</td><td>Short block</td><td rowspan="5">Full course</td><td>Short block</td><td rowspan="5">← This way is not possible!</td></tr>
<tr><td>2</td><td rowspan="4">Large block</td><td>Short block</td></tr>
<tr><td>3</td><td>Short block</td></tr>
<tr><td>4</td><td>Short block</td></tr>
<tr><td>5</td><td>Short block</td></tr>
<tr><td>6</td><td rowspan="3">Large block</td><td rowspan="5">Full course</td><td rowspan="5">Full course</td><td>Short block</td><td rowspan="5">← This way is not possible!</td></tr>
<tr><td>7</td><td>Short block</td></tr>
<tr><td>8</td><td>Short block</td></tr>
<tr><td>9</td><td rowspan="2">Short block</td><td>Short block</td></tr>
<tr><td>10</td><td>Short block</td></tr>
</table>

The principal rule is: 5 full courses = 25 hours/week = 30 ECTS. It is not possible to place 5 short blocks instead of two full courses since the sum would be 10 ECTS, and 12 ECTS is needed. Therefore, a combination of large-short or short-large block-courses is to be chosen.

The objective to introduce block-courses is in less teaching material needed for certain courses and passing exams before the final semestral exam period.

Type of course	Block field	Hours	ECTS	Course and exam period
Full course	Full	5	6	Full – in January or June (in 15th week of semester)
Large block	Larger part	3	4	Only that course – earlier (in 9th week of semester) (*)
Short block	Smaller part	2	2	Only that course – earlier (in 6th week of semester) (*)
				(*) in the 15th week only courses from compatible block-courses remain

Example: the first two semesters

Passing the exams			
	Date	Number of exams	Courses
1st semester courses	Start of November	2	English 1, Constructive geometry and graphics
	End of November	1	Physics (without measurements)
	January	5	Mathematics 1, Mechanics 1, Strength of materials, Physics (part with measurements), Programming
			Additional opportunities (repeat exams) – June or September
2nd semester courses	End of March	2	English 2, Engineering materials 1
	June	5	Mathematics 2, Basics of strength of constructions, Engineering graphics, Computational tools, Basics of sociology and economics
			Additional opportunities (repeat exams) – September

Rule for average grade calculation

Each year of studies has 10 courses with 5 hours each. Accordingly, a general calculation is such that the sum of 10 various grades is divided by 10. If a student does not pass a certain exam, the grade for that exam (course) is entered as 5 (five) into calculation of the average grade. The grades for each course vary from 5 (failed) to 10 being the maximum.

However, when a full course (5 hours) is divided into blocks with 2 and 3 hours each, then a pondered grade has to be found as for a comprising 5-hour course. Accordingly, when a grade of x is earned in a 2-hour course, and a grade of y in a 3-hour course, then a pondered total grade for those two courses (corresponding to a grade of a full course) is: $(2 \cdot x + 3 \cdot y)/5$. This grade is then added as one tenth to other full course grades.

Essentially, this yields to the following formula:
Each grade is multiplied by the number of course teaching hours per week (not by ECTS number), **then a total sum is made for all the courses, and finally the sum is divided by 50** (total number of teaching hours per week for all courses in a certain year).

Course schedule (tempo-plan) – an example

5-hour per week courses (75 hours per semester) = 6 ECTS

	Number of hours				
	Active teaching		Individual student work	Knowledge checks	Σ hours
Week	A	E	M	T	
1	3 – A1	1 – E1		1 – T1	5
2	3 – A2	2 – E2			5
3	2 – A3	2 – E3	1 – M1		5
4		4 – E4		1 – T2	5
5		4 – E5		1 – T3	5
6	2 – A4	2 – E6	1 – M2		5
7	2 – A5	2 – E7	1 – M3		5
8	2 – A6	2 – E8	1 – M4		5
9		3 – E9	1 – M5	1 – T4	5
10	2 – A7	2 – E10		1 – T5	5
11	2 – A8	3 – E11			5
12	2 – A9	3 – E12			5
13		4 – E13		1 – T6	5
14		4 – E14		1 – T7	5
15		2 – E15		3 – TT	5
Σ hours	**20**	**40**	**sum M+T=15**		**75**

The best grade in a course is evaluated as 100 points (100%) and is comprised of passed knowledge checks T1-7 and the final exam TT with best grades. Each T1-7 is evaluated with certain number of points (for example T1(entrance test)=2, T2 and T4(tests) 5 points each, T3, T5 and T7(colloquia) 15 points each, T6(work defense)=10). Sum T1-7 must be between **30-70** (Faculty recommends near 70). Before the final exam, only students with best knowledge can receive the full sum of these points, while others with less knowledge receive an appropriate portion of the sum. A student is not allowed to take the final exam unless a certain amount of points T1-7 has been received. The final exam TT equals the remaining number of points up to 100 in respect to the highest possible sum T1-7. The sum of points gained through T1-7 and points gained on TT, gives the total sum of points for a course. On this basis, a positive grade of 6 to 10 is established, or a negative one 5. After acquiring a positive grade, the student collects 6 ECTS.

A - Types of active teaching (new material):

- Lectures and presentations given by the professor in the classroom or laboratory. Recommendation of the technical faculties is: „For each lecture a handout material, printed or hand-written, must be delivered to students to the extent of 6-8 pages per two hours of teaching class“.

E - Types of active teaching (explanations, examples of lectured material):

- Analysis and explanations of material (possibly additional material not obligatory for the exam)
- Class exercises (oral, auditorial, with and without calculation examples) - Repetitorium
- Guidelines for seminar work
- Guidelines for design projects
- Guidelines for laboratory exercises
- Execution of laboratory exercises
- Discussions and workshops
- Practical work
- Excursion
- Consultations

M - Types of individual student work (not counted in active teaching!):

- Solving calculation examples
- Review (without grade evaluation) of calculation examples given for student’s homework
- Work in the laboratory – Practicum
- Seminar work
- Design projects with technical documentation
- Reports and their presentations (on a certain topic, calculation or laboratory exercise)
- Semestral work

T - Types of knowledge check:

- Defense and evaluation of calculation examples done as homework
- Defense and evaluation of seminar work
- Defense and evaluation of design projects with technical documentation
- Defense and evaluation of reports and their presentation
- Defense and evaluation of semestral work
- Colloquia with evaluation
- Tests (entrance or intermediate) with evaluation

TT - Either oral or written final exam (part of the grade for TT and total grade).

Examples of three types of courses:

1. 5-hour per week courses (75 hours per semester) = 6 ECTS – an example

	Number of hours						
	Active teaching			Individual student work			
Week	Lecturing of new material (Prof.)	Lecture explanations, Examples in lectures (Prof.)	Exercises (Assist.)	Intermediate knowledge checks without evaluation (progress in work on seminar work, design projects, presentations, laboratories)	Knowledge checks with evaluation		Σ hours
1	3 – Lesson 1	1 – Less.1			1 – Entrance test	T1	5
2	3 – Lesson 2		2 – Less.1-2				5
3	2 – Lesson 3	1 – Less.2-3	1 – Less.1-3	1 – Review			5
4		1 – Less.2-3	3 – Less.2-3		1 – Test	T2	5
5		1 – Less.2-3	3 – Less.2-3		1 – Colloqium	T3	5
6	2 – Lesson 4		2 – Less.3-4	1 – Review			5
7	2 – Lesson 5		2 – Less.3-4	1 – Review			5
8	2 – Lesson 6		2 – Less.4-5	1 – Review			5
9		1 – Less.4-6	2 – Less.4-5	1 – Review	1 – Des.Project	T4	5
10	2 – Lesson 7		2 – Less.5-6		1 – Colloqium	T5	5
11	2 – Lesson 8		3 – Seminar				5
12	2 – Lesson 9		3 – Seminar				5
13		2 – Less.7-9	2 – Less.7-9		1 – Lab.Seminar	T6	5
14		2 – Less.7-9	2 – Less.1-9		1 – Colloqium	T7	5
15		1 – Consult.	1 – Consult.		3 – Exam	TT	5
Σ hours	**20**	**10**	**30**	(5 to10)	(10 to 5)		**75**

2. 3-hour per week block-courses (45 hours per semester) = 4 ECTS – an example

	Number of hours						
	Active teaching			Individual student work			
Week	Lecturing of new material (Prof.)	Lecture explanations, Examples in lectures (Prof.)	Exercises (Assist.)	Intermediate knowledge checks without evaluation (progress in work on seminar work, design projects, presentations, laboratories)	Knowledge checks with evaluation		Σ hours
1	3 – Lesson 1		1 – Less.1		1 – Entrance test	T1	5
2	3 – Lesson 2	1 – Less.1-2	1 – Less.1-2				5
3	2 – Lesson 3		2 – Less.1-3	1 – Review			5
4		1 – Less.2-3	4 – Less.2-3				5
5		1 – Less.2-3	2 – Less.2-3		2 – Colloqium	T2	5
6	2 – Lesson 4		2 – Less.3-4	1 – Review			5
7	2 – Lesson 5	1 – Less.3-4	2 – Less.3-4				5
8		1 – Less.4-5	3 – Less.4-5	1 – Review			5
9		1 – Less.4-5	1 – Less.4-5		3 – Exam	TT	5
Σ hours	**12**	**6**	**18**	(3 to 6)	(6 to 3)		**45**

3. 2-hour per week block-courses (30 hours per semester) = 2 ECTS – an example

	Number of hours						
	Active teaching			Individual student work			
Week	Lecturing of new material (Prof.)	Lecture explanations, Examples in lectures (Prof.)	Exercises (Assist.)	Intermediate knowledge checks without evaluation (progress in work on seminar work, design projects, presentations, laboratories)	Knowledge checks with evaluation		Σ hours
1	2 – Lesson 1		2 – Less.1		1 – Entrance test	T1	5
2	2 – Lesson 2	1 – Less.1-2	2 – Less.1-2				5
3	2 – Lesson 3		2 – Less.1-3	1 – Review			5
4		1 – Less.2-3	4 – Less.2-3				5
5	2 – Lesson 4	1 – Less.2-3	1 – Less.2-3	1 – Review			5
6		1 – Less.4	1 – Less.4		3 – Exam	TT	5
Σ hours	**8**	**4**	**12**	(2 to 4)	(4 to 2)		**30**

Maximal number of students for Bachelor academic studies is **540,** and **lectures are organized in groups of 180 students maximum, 60 for general exercises and 20 students in laboratory exercises.**

Schedule of lessons and lecture attendance

1st year	2nd year		Monday	Tuesday	Wednesday	Thursday	Friday
8.00-8.45	14.00-14.45	1st class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
9.00-9.45	15.00-15.45	2nd class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
10.00-10.45	16.00-16.45	3rd class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
11.00-11.45	17.00-17.45	4th class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
12.00-12.45	18.00-18.45	5th class hour	Course 1	Course 2	Course 3	Course 4	Course 5

Attendance of lectures is obligatory for students, as well as the lecturer's record-keeping on it. In order to gain pre-exam points, a knowledge check is obligatory during class-hours. In such a way, parts of the exam are passed earlier, and so the final exam includes only the remaining topics. Final exam check is possible only at additional two times during the same academic year. If failed to pass, the student has to repeat the study of the same academic year without the possibility of budget funding. The student has to take the final exam even if he/she may not want to collect additional points.

Elective courses

Just before the start of 3rd, 4th, 5th and 6th semester, the **student chooses** elective courses (subjects) that he/she wants to attend and pass exams in. For each semester, as well as for **each position** of a course in a certain semester, a separate list (menu) of courses exists. However, the following conditions must be borne in mind:

1	2	3	4	5	6
					6.3
			4.4	5.4	6.4
		3.5		5.5	6.5

1. If the student chooses courses completely **voluntarily,** the Diploma Supplement will not state any of the specialization areas.
2. If the student chooses courses obeying to **conditions prescribed** by certain departments (specialization areas) regarding the courses recommended for choice, the Diploma Supplement will state the specialization area obtained.
3. The student has the right to enroll in M.Sc. studies into any elective module (specialization area) he/she is interested in, regardless of the statement in his/her B.Sc. Diploma Supplement (with or without a certain specialization area). The elective module represents a group of interconnected specialization courses obligatory (compulsory) to be attended and passed for such a chosen module

All the elective courses on a certain list for one of the positions are in competition and the student can choose only one course from the list. The course has the nominated lecturer (if it is run only for one group, which is the default situation) or the list of other possible lecturers if it is organized for several groups. The course is launched only for a group of minimum 10 interested students. During the process of choosing, the priority is given to the students with higher average grades. When the group for one lecturer is full to the maximum number of students in a group allowed by accreditation rules, then the student has to choose the same course given by another lecturer (if offered), or a different course. The same course can not be offered in two positions within the same study program. Every professor has the possibility to offer a course with a certain contents and appropriate printed material for which he/she presumes that students will show interest.

The course **"Skill praxis B"** is to be chosen from the list offered by certain departments, as well as from the Faculty (general type of praxis). The course may or may not be prescribed in conditions 2. "Skill praxis B" has the hour fund of 46, out of which 1 hour is reserved for knowledge check and gained skill.

"Skill praxis B" offered by departments

Chairs and departments organize and perform the skill praxis in a way they find the most appropriate for the student, as well as technically possible (sustainable). For example: a tour around one or several laboratories, work in the laboratory, tour and work in **certain industrial units** (production and design centers) or factories (the most desirable way of performing skill praxis), visits (excursions) to certain objects, etc. The time period should be accommodated to the needs and possibilities of both department and student – or **during summer** (which is the most desirable time), or on a certain week day, or on a daily basis when there are no lectures, or combined

in a block at the end of semester, etc. Anyway, skill praxis is performed apart from active teaching hours, and 45 class-hours (i.e. about 30 working hours) represent «employee working hours» of the praxis, which may represent approximately 7 days in a block. Each chair (department) nominates a professor and assistant who will take care and control the praxis performance.

"Skill praxis B" offered by the Faculty

It is performed by visit and work in several faculty laboratories and possibly visits to certain factories chosen by some departments. The Faculty nominates the professor and assistant in charge for the praxis.

Lists of elective courses

List of elective courses for position 3.5 – 9 courses, 5 teaching hours per week each (6 ECTS)

Fuel, lubricants and industrial water; Quality of engineering education; Introduction to aerospace engineering; Introduction to process and environmental engineering; Fundamentals of biomedical engineering; Introduction to industrial engineering; Introduction to weapon systems; Engineering economy analysis; Engineering communications.

List of elective courses for position 4.4 – 18 courses, 5 teaching hours per week each (6 ECTS)

Business management; Testing of machine elements and constructions; Cybernetics; Pipeline and valves; Human physiology and anatomy for engineers; Computational methods in aeronautics; Computer simulation and artificial intelligence; Introduction to energy engineering; Fundamentals of weapon systems design; Management of production processes; Fundamentals of machine design; Machine elements 3; Basics of motor vehicles; Vehicle systems; Aerodynamic constructions; Basics of WEB design; Computer graphics; Renewable and secondary resources.

List of elective skill praxis for position 4.8

Skill praxis B (Faculty); Skill praxis B – БМИ; – БРО; – ВАЗ; – ДУМ; – ЖЕМ; – ЗЗК; – ИБС; – ИИЕ; – МИТ; –МОВ; – МОТ; – ПРМ; – ПРО; – ПТХ; – САУ; – СИН; – ТЕН; – ТКЛ; – ТТА; – ХЕН.

List of elective courses for position 5.4 – 17 courses, 5 teaching hours per week each (6 ECTS)

Production technologies and metrology; Theory of agricultural machines and equipment; Control systems; Windturbines; WEB design in mechanical engineering; Aerodynamics; Biomechanics of locomotor system; Mechanical design of process equipment; Shape modelling; Fundamentals of steam boilers; Reciprocating compressors; Vehicle dynamics; Fundamentals of projectiles propulsion; Buoyancy and stability of ship 1; Engineering measurements and sensors; Production Management 1; Introduction to Tribology

List of elective courses for position 5.5 – 20 courses, 5 teaching hours per week each (6 ECTS)

Introduction to engineering simulations; Fuels and combustion; Fundamentals of welding; Machine design; Ship structures 1; CAD/CAM systems; Pipelines; Industrial ergonomics; Informational integration of business functions; Machines and equipment for food processing and production; Missile flight mechanics; Fundamentals of steel structures; Unit operations in process industry; Design of mechanisms; Theory of traction; Computer control; Internal combustion engines fundamentals; Applied thermodynamics; Biophysics; Theory of elasticity.

List of elective courses for position 6.3 – 23 courses, 5 teaching hours per week each (6 ECTS)

Fundamentals of refrigeration; Electronics and biomedical measurements; Engineering in food production; Machine tools; Fundamentals of construction and mining machines; Interactive modelling and design; Basics of turbomachinery; Basics of heat transfer; Vehicle performances; Flight craft propulsion and systems; Software engineering 1, Shipbuilding technology; Classical weapon design; Structural analysis of flying vehicles; Fundamentals of IC engine design; Basics of rail vehicles; Basics of technological operations in food industry; Design and testing of welded structures; Hydraulics and pneumatics; Business-production information systems; Maintenance management; Technical regulations (2 hours – 2 ECTS) + Introduction to fire safety (3 hours – 4 ECTS); Introduction to energy use in process engineering (2 hours – 2 ECTS) + Processes and equipment design in environmental protection engineering (3 hours – 4 ECTS) (in last two combinations large blocks may be permutated).

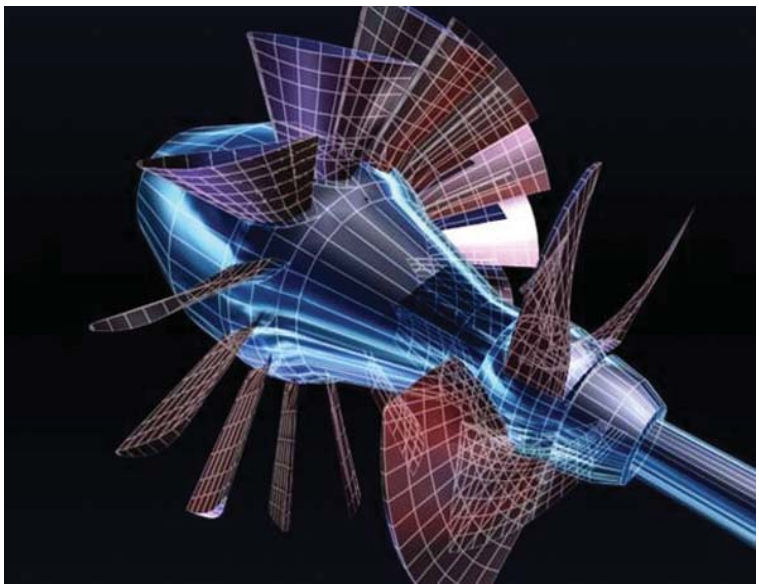
List of elective courses for position 6.4 – 24 courses, 5 teaching hours per week each (6 ECTS)

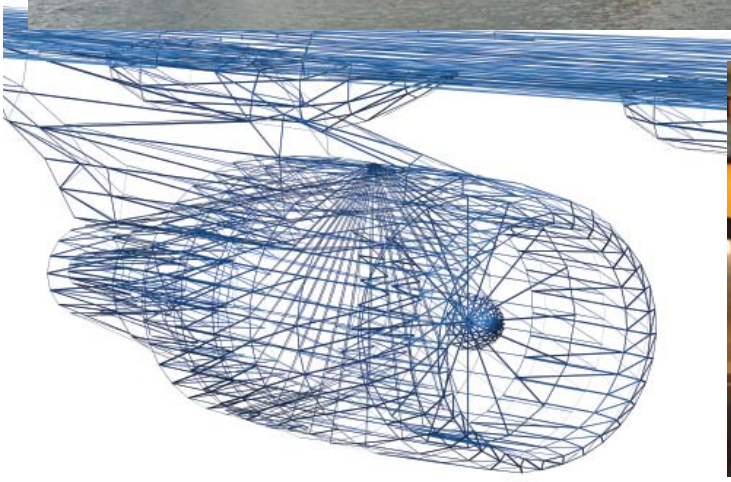
Theory of mechanical vibrations; Tools and Tooling; Equipment in process industry; Biomaterials 1; Light and composite structures; Electronics; Fuel and industrial water; Hydraulic and pneumatic mechanisms and piping; Design and aircraft production technology; Missile weapon design; Quality in service; FEM analysis; Fundamentals of buildings' heating; Diagnostics and maintenance of IC engines; Database design; Control system design; Design

of vehicles 1; Repair welding and surfacing; Material handling equipment; Pumps and fans; Tribotechnique; Drying and hygrothermal processes; Life cycle of rail vehicles; Ship systems (3 hours – 4 ECTS) + Ship equipment (2 hours – 2 ECTS).

«Final course (B.Sc. work)» in position 6.5

Final report (B.Sc. work) is to be taken from the list of courses, obligatory or elective, passed by the students during the course of studies. The course has to be in the field of mechanical engineering. Lecturing is done through teaching of the guidelines for design calculation and documentation, or for seminar reports. The final exam is obligatorily done through the printed report defense of student. The report may be presented and defended in parallel to passing of other exams.





University of Belgrade
Faculty of Mechanical Engineering

2nd level of studies

M.Sc. (graduate) Academic Studies
120 ECTS

Hours weekly	1st year		2nd year	
	1st	2nd	3rd	4th
1	COURSE OF ELECTIVE MODULE 1.1.5	COURSE OF ELECTIVE MODULE 2.1.5	COURSE OF ELECTIVE MODULE 3.1.5	
2				
3				
4				
5				
6	COURSE OF ELECTIVE MODULE 1.2.5	COURSE OF ELECTIVE MODULE 2.2.5	COURSE OF ELECTIVE MODULE 3.2.5	
7				
8				
9				
10				
11	Mechanics M or Fluid mechanics M 1.3.5	COURSE OF ELECTIVE MODULE 2.3.5	COURSE OF ELECTIVE MODULE 3.3.5	Master (M.Sc.) thesis (Diploma work) 4.9
12				
13				
14				
15				
16	Thermodynamics M or Mechatronics 1.4.5	Elective course 2.4.5	Elective course 3.4.5	
17				
18				
19				
20				
21	Elective course 1.5.5	Elective course 2.5.5	Elective course 3.5.5	
22				
23				
24				
25				
		Skill praxis M of elective module 2.8		

Legend: white boxes – obligatory (compulsory) courses (subjects), colored boxes – elective courses (subjects).

Each course lasts one semester with 5 hours per week, which equals ECTS 6 (ECTS – European Credit Transfer System).

Exceptions: Skill praxis (internship, training, practice) M – minimum 46 hours of student's individual work equals ECTS 1; M.Sc. thesis – student's research work (independent work) equals ECTS 29.

All explanations given for B.Sc. studies also apply here (introduction of block-courses, matrix coding, average grade calculation, course schedule (tempo-plan), etc.). The main differences are:

- **When enrolling in M.Sc. studies, it is obligatory for the student to choose one elective module (specialization area, department)**. Minimal number of students for a module to be activated is 5 (for the 7th semester, while for the 9th there is no minimum limit), and the maximal is 32.
- Maximal number of students for Master academic studies is **416,** and teaching is organized in groups of **maximum 32** students for lectures, **16** for general exercises, and **8** for laboratory work.
- The course "Skill praxis M" is organized by departments that teach the module.
- Choosing of elective courses from the menus for positions is the same as in B.Sc. studies, the only difference being for positions 1.3 and 1.4 in the first semester, where the choice is limited to one course out of two offered. Exceptionally, when a student wants to attend both courses given at one position, then he/she applies a written request to the Vice-Dean for Teaching.
- Other elective courses in all semesters go by the criterion of minimum 10 interested students needed for activating a course.
- The total average grade is determined from grades from M.Sc. thesis and Skill praxis M that are united as a single grade by pondering, according to the number of ECTS, and as such, that grade participates in the total average grade with pondering of 25 hours.

"M.Sc. thesis" is to be taken with supervisor from the pool of professors of obligatory courses of the elective module or elective courses the student has passed, where the menu of such courses is defined by departments leading the module. M.Sc. thesis must contain at least two of the following fields: material on the topic studied and analyzed, self-performed numerical calculation, self-done laboratory work, and/or self-performed mechanical design. Thesis defense cannot be done unless all the exams are passed.

Right to enrollment in M.Sc. studies have all the students who completed B.Sc. studies at any faculty in technical sciences. Students who completed professional studies for a bachelor level do not have the right to switch to academic studies, but rather must enroll to B.Sc. studies from the very start.

Lists of modules with obligatory courses

1.	2.	3.	4.
1.1.5	2.1.5	3.1.5	
1.2.5	2.2.5	3.2.5	
	2.3.5	3.3.5	4.9
	2.8		

БМИ	Biomedical engineering
1.1.5	Fractal mechanics
1.2.5	Biomedical instrumentation and equipment
2.1.5	Biomaterials 2
2.2.5	Biomechanics of tissue and organs
2.3.5	Signal processing
2.8	Skill praxis M – БМИ
3.1.5	Design of assistive medical devices
3.2.5	Design of biomedical devices and machines
3.3.5	Nano-medical engineering
4.9	M.Sc. thesis (Diploma work)

БРО	Naval architecture
1.1.5	Ship resistance
1.2.5	Ship strength 1
2.1.5	Ship propulsion
2.2.5	Buoyancy and stability of ship 2
2.3.5	Ship structures 2
2.8	Skill praxis M – БРО
3.1.5	Ship design
3.2.5	Seakeeping
3.3.3 3.3.2	Marine Engines Ship turbines and boilers
4.9	M.Sc. thesis (Diploma work)

ВАЗ	Aerospace engineering
1.1.5	Applied aerodynamics
1.2.5	Structural analysis
2.1.5	Computational aerodynamics
2.2.5	Flight dynamics
2.3.5	Composite structures
2.8	Skill praxis M – ВАЗ
3.1.5	Aircraft control and systems
3.2.5	Aircraft propulsion
3.3.5	Aircraft design
4.9	M.Sc. thesis (Diploma work)

ДУМ	Design in mechanical engineering
1.1.5	Product aesthetics (with ПРМ)
1.2.5	Axiomatic methods
2.1.5	Ergonomic design
2.2.5	Development of Machine Systems (with ЗЗК)
2.3.5	Decision-making methods
2.8	Skill praxis M – ДУМ
3.1.5	Bionics in design
3.2.5	Special methods for product development
3.3.5	Eco design (with ТКЛ)
4.9	M.Sc. thesis (Diploma work)

ЖЕМ	Railway mechanical engineering	ЗЗК	Welding and welded structures
1.1.5	Railway cars 1	1.1.3 1.1.2	Engineering materials 3 Fuel, lubricants and industrial water 2
1.2.5	Theory of traction	1.2.5	Finite element method 2
2.1.5	Locomotives 1	2.1.5	Tribomechanical systems
2.2.5	Railway cars 2	2.2.5	Development of machine systems (with ДУМ)
2.3.5	Brakes of rail vehicles	2.3.5	Service strength
2.8	Skill praxis M – ЖЕМ	2.8	Skill praxis M – ЗЗК
3.1.5	Locomotives 2	3.1.5	Specialized joining techniques
3.2.5	Railway vehicles maintenance	3.2.5	Gearbox reliability
3.3.5	Basics of rail vehicle dynamics	3.3.5	Structural integrity
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

ИБС	Engineering of biotechnical systems	ИИЕ	Industrial engineering
1.1.5	Technological processes in agro complex	1.1.5	Production management 2
1.2.5	Tractors and self-propelled agricultural machines	1.2.5	Quantitative methods
2.1.5	Attached agricultural machines and equipments	2.1.5	Industrial logistics
2.2.5	Special techniques and technologies in drying process	2.2.5	Ergonomic design
2.3.5	Exploitation and maintenance of agricultural machines and equipment	2.3.5	Engineering economy (with ПРМ)
2.8	Skill praxis M – ИБС	2.8	Skill praxis M – ИИЕ
3.1.5	Design of agricultural machines	3.1.5	Operations research
3.2.5	Measurements and automation in agricultural machines and equipment	3.2.5	Fundamentals of database systems
3.3.5	Design of plants and process and energy systems (with ПРМ)	3.3.5	Industrial management
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

МИТ	Information technologies	МОВ	Motor vehicles
1.1.5	Programming language C	1.1.5	Design of vehicles
1.2.5	Object oriented programming and JAVA	1.2.5	System effectiveness
2.1.5	Digital systems (with САУ)	2.1.5	Vehicle drive and running gears
2.2.5	Programmable control systems	2.2.5	Automotive friction systems
2.3.5	Data structures and algorithms	2.3.5	Vehicle mechatronics
2.8	Skill praxis M – МИТ	2.8	Skill praxis M – МОВ
3.1.5	SQL	3.1.5	Vehicle support structures
3.2.5	Construction engineering (modelling and optimisation)	3.2.5	Vehicle testing
3.3.5	Introduction to engineering simulations	3.3.5	Vehicle maintenance
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

МОТ	Internal combustion engines	ПРМ	Food industry engineering
1.1.5	Engine working processes	1.1.5	Product aesthetics (with ДУМ)
1.2.5	Engine fuelling and ignition systems	1.2.5	Refrigeration equipment (with ТТА)
2.1.5	Engine design 1	2.1.5	Engineering condition monitoring
2.2.5	IC engines mechatronics	2.2.5	Mechanisms and manipulators design
2.3.5	Supercharging of IC engines	2.3.5	Engineering economy (with ИИЕ)
2.8	Skill praxis M – МОТ	2.8	Skill praxis M – ПРМ
3.1.5	Engine design project	3.1.5	Packaging machines
3.2.5	Engine testing;	3.2.5	Food processing machines
3.3.2 3.3.3	Engine design 2 Ecology of mobile power sources	3.3.5	Design of plants and process and energy systems (with ИБС)
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

ПРО	Production engineering	ПТХ	Process engineering and environment protection
1.1.5	Manufacturing automation	1.1.5	Transport phenomena in process industry
1.2.5	Industrial robots	1.2.5	Mechanical and hydromechanical operations and equipment
2.1.5	Manufacturing systems design	2.1.5	Heat transfer operations and equipment
2.2.5	Computer integrated systems and technologies	2.2.2 2.2.3	Energy in process engineering Concepts of environmental and workplace protection
2.3.5	Production information systems	2.3.5	Chemical and biochemical operations and reactors
2.8	Skill praxis M – ПРО	2.8	Skill praxis M – ПТХ
3.1.5	New technologies	3.1.5	Design, construction and exploitation of process plants
3.2.5	Quality management	3.2.5	Mass transfer operations and equipment
3.3.5	Intelligent manufacturing systems	3.3.2 3.3.3	Air pollution control Waste and wastewater management
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

САУ	Control Engineering	СИН	Weapon systems
1.1.5	Automation systems programming	1.1.5	Physics of explosive processes
1.2.5	Automatic control	1.2.3 1.2.2	Missile flight dynamics Missile aerodynamics
2.1.5	Digital systems (with МИТ)	2.1.3 2.1.2	Missile propulsion Launching equipment
2.2.5	Nonlinear systems 1	2.2.3 2.2.2	Interior ballistics Automatic weapons
2.3.5	Linear system design	2.3.3 2.3.2	Design of projectiles Launching theory
2.8	Skill praxis M – САУ	2.8	Skill praxis M – СИН
3.1.5	Nonlinear systems 2	3.1.3 3.1.2	Artillery weapons design Missile guidance and control
3.2.5	Control systems technology	3.2.3 3.2.2	Missile design Fire control systems
3.3.5	Object and process dynamics	3.3.3 3.3.2	Terminal ballistics Optical devices and optoelectronics
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

ТЕН	Thermal power engineering	ТКЛ	Material handling, constructions and logistics
1.1.5	Steam turbines 1	1.1.5	Facility layout and industrial logistics
1.2.5	Energy steam boilers 1	1.2.5	Computer aided design in material handling practice
2.1.5	Steam turbines 2	2.1.5	Structural and stress analysis
2.2.5	Thermal power plants	2.2.5	Material flow and logistics systems design
2.3.5	Gas turbines	2.3.5	Material handling and conveying machinery
2.8	Skill praxis M – ТЕН	2.8	Skill praxis M – ТКЛ
3.1.5	Planning in energy engineering	3.1.5	Mining and construction machines
3.2.5	Design and exploitation of thermal power plants	3.2.5	Cranes design
3.3.5	Steam generators	3.3.5	Eco design (with ДУМ)
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

ТТА	Thermal science engineering	ХЕН	Hydropower engineering
1.1.5	Steam boilers elements and equipment	1.1.5	Theory of turbomachinery
1.2.5	Refrigeration equipment (with ПРМ)	1.2.5	Pumps
2.1.5	Steam boiler processes	2.1.5	Hydraulic turbines
2.2.5	Refrigeration systems	2.2.5	Design computations in turbomachinery
2.3.5	Fundamentals of air conditioning	2.3.5	Fans and turbo-compressors
2.8	Skill praxis M – ТТА	2.8	Skill praxis M – ХЕН
3.1.5	Thermal power plants and heat plants	3.1.5	Hydropower plants and equipment
3.2.5	Heat pumps	3.2.5	Hydraulic torque converters
3.3.5	Ventilating and air conditioning systems	3.3.5	Hydropower measurements
4.9	M.Sc. thesis (Diploma work)	4.9	M.Sc. thesis (Diploma work)

CEM	Computational Engineering
1.1.5	Programming
1.2.5	Scientific Computing 1
2.1.5	Numerical Analysis 1
2.2.5	Scientific Computing 2
2.3.3 2.3.2	Algorithms Software Engineering
2.8	Skill praxis M – CEM
3.1.5	Numerical Analysis 2
3.2.3 3.2.2	Parallel Numerics High Performance Computing
3.3.5	Scientific visualisation
4.9	Master thesis

With support of Technical University of Munich.
Lectures only in english.

1.	2.	3.	4.
1.3.5			
1.4.5	2.4.5	3.4.5	
1.5.5	2.5.5	3.5.5	

Lists of elective courses

List of elective courses for position 1.3 – 2 courses, 5 teaching hours per week each (6 ECTS)

Mechanics M; Fluid mechanics M.

List of elective courses for position 1.4 – 2 courses, 5 teaching hours per week each (6 ECTS)

Thermodynamics M; Mechatronics.

List of elective courses for position 1.5 – 23 courses, 5 teaching hours per week each (6 ECTS)

Mechanics of robots; Computational fluid dynamics (CFD); Introduction to nanosystems; Avionics; Industrial and district heating thermal power plants; Risk engineering and fire safety systems; Quantum mechanics; Applied theory of plasticity; Finite element method; Nuclear reactors; Fundamentals of welding; Aircraft performances; Transport phenomena; Heat and mass transfer; Combustion; Automatic control systems; Space heating systems; Probability and statistics; Electric machinery; Measurements and control in process Industry; Pipeline fluid transport; Fundamentals of heat transfer phenomena and drying techniques; Internal combustion engines fundamentals.

List of elective courses for position 2.4 – 20 courses, 5 teaching hours per week each (6 ECTS)

Continuum mechanics; Theory of Mechanical Vibrations; Bioautomatics; Quality System and Integrated Management Systems; Electronics; Nanotechnology; High Speed Aerodynamics; Ship Strength 2; Linear stochastic systems; Service Properties of Welded Joints; Project Management; Application of turbomachinery; Assembly systems; Wind turbines 2; Environmental Protection in Thermal Power Engineering; Tribotechnique; Pumps and fans; Furnaces and boilers in industry; Diagnostics and maintenance of IC engines; Analytical mechanics (3 hours – 4 ECTS) + Dynamics of variable mass systems (2 hours – 2 ECTS).

List of elective courses for position 2.5 – 20 courses, 5 teaching hours per week each (6 ECTS)

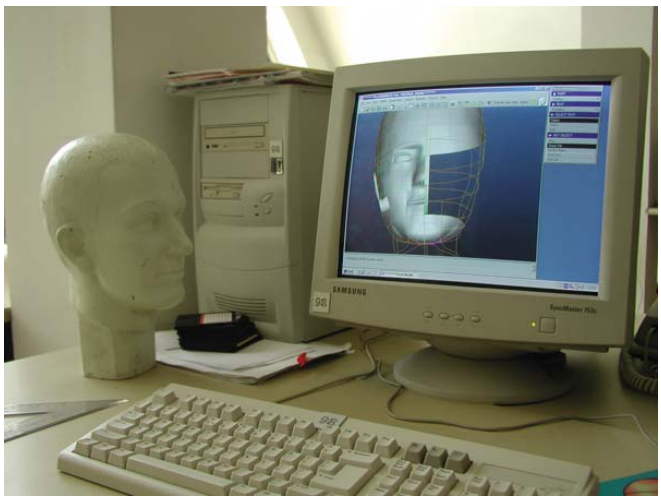
Theory of anisotropic bodies; Dynamics of rigid body systems; Gas dynamics; Sheet-metal processing tools; Biotechnology; Two-phase flows with phase transition; Helicopters; Computer simulation in manufacturing automation; Welding quality control; Quantum information technologies; New generation of machine tools and robots; Biofluid mechanics; Equipment of process systems; Strength of constructions; Rocket and space propulsion; Thermal turbomachinery; Design of logistic and warehouse systems; Design of pumps, fans and turbo-compressors; Systems engineering; Multiphase flows..

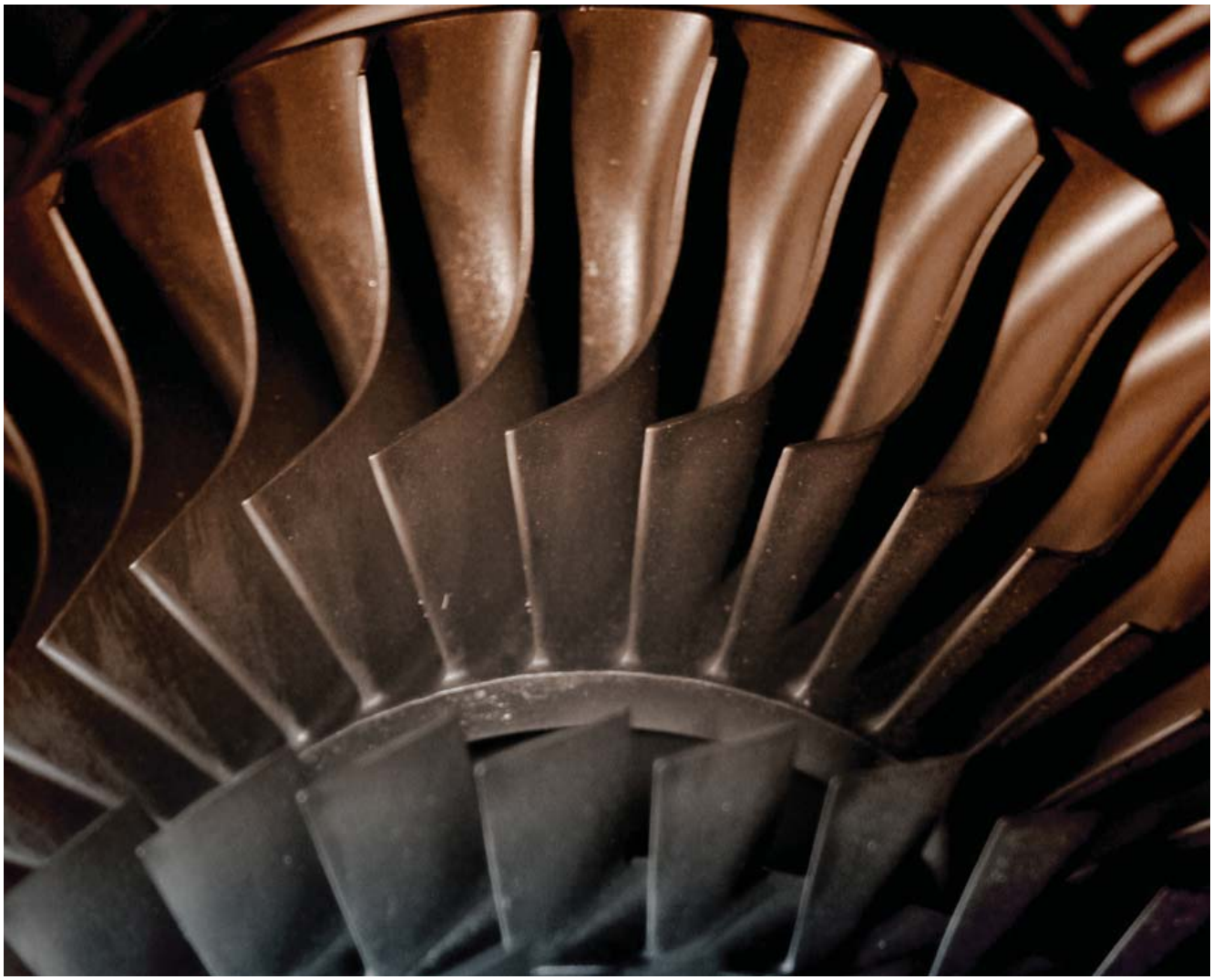
List of elective courses for position 3.4 – 11 courses, 5 teaching hours per week each (6 ECTS)

Fuzzy control systems; Technical regulations and standards; Project management & air regulations; Information technologies in medicine; Aircraft maintenance; Energy steam boilers 2; Mechatronics systems; Engineering measurements and sensors; Organizational design; Reciprocating compressors; Ship maneuvering (2 hours – 2 ECTS) + Software application in ship design (3 hours – 4 ECTS).

List of elective courses for position 3.5 – 16 courses, 5 teaching hours per week each (6 ECTS)

Efficiency of process and energy systems; Process identification; Air breathing engine testing; Computer simulations of thermal-hydraulic processes and CFD; Failure and diagnostics; Plant and machinery design for food production and processing; Expert systems; Computer control and monitoring in manufacturing automation; Artificial neural networks and artificial intelligence; Urban and special rail vehicles; Coordinate measuring machines; Turbo-compressors; Aircraft armament; Man-machine system design; Forensic engineering; Burning, technical and medical gases (2 hours – 2 ECTS) + Drying and dryers (3 hours – 4 ECTS).





University of Belgrade
Faculty of Mechanical Engineering

3rd level of studies

Doctoral (Ph.D.) studies
ECTS 180

<table>
<tr><td rowspan="2">ECTS</td><td colspan="2">1st year</td><td colspan="2">2nd year</td><td colspan="2">3rd year</td></tr>
<tr><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>5th</td><td>6th</td></tr>
<tr><td>5</td><td>Advanced course of mathematics 1.1</td><td>Advanced course of mechanics or fluid mechanics 2.1</td><td>Elective course 3.1</td><td>Ph.D. thesis proposal preparation</td><td rowspan="2">Ph.D. thesis writing</td><td rowspan="2">Preparation work on Ph.D. thesis public defense</td></tr>
<tr><td>5</td><td>Numerical methods 1.2</td><td>Elective course 2.2</td><td>Elective course 3.2</td><td rowspan="4">Laboratory, research, publication (work on thesis)</td></tr>
<tr><td>5</td><td>OMSR and communication 1.3</td><td>Elective course 2.3</td><td rowspan="3">Laboratory, research, publication (work on thesis)</td><td rowspan="3">Laboratory, research, publication (work on thesis)</td><td rowspan="3">Laboratory, research, publication (work on thesis)</td></tr>
<tr><td>5</td><td>Elective course 1.4</td><td rowspan="2">Laboratory, research, publication (work on thesis)</td></tr>
<tr><td>10</td><td>Laboratory, research, publication (work on thesis)</td></tr>
<tr><td colspan="7">Obligatory teaching work as help in exercises on lower levels of studies</td></tr>
</table>

Title gained: **Doctor of Philosophy (Science) – Mechanical Engineering (Ph.D. ME).**

Doctoral studies have 180 ECTS and last at least three years. They comprise attending and passing exams in 4 obligatory courses and 5 elective ones, for which a wider list (menu) of offered courses exists.
White boxes – obligatory (compulsory) courses (subjects), colored boxes – elective courses.
Each course lasts one semester, has **35 lecture hours for active teaching** with additional consultations and knowledge tests, and equals ECTS 5.

Maximal number of student for doctoral studies is **50**.

All elective courses are to be chosen upon obligatory approval of the mentor (supervisor, major professor). Among the maximum of 3 courses the student may choose courses not from the Faculty of Mechanical Engineering, but also from the lists offered by some other technical faculties of the University

Additional points up to ECTS 30 within the semester, the student gains through work in the laboratory, research with obligatory publishing in scientific papers, and obligatory lecturing on lower level of studies (mostly assisting exercises).

During doctoral studies::

- 1 hour per week lecturing equals ECTS 1, with a maximal number of ECTS achieved by this way limited to 30;
- 1 published paper in an international scientific journal of an impact factor (IF) cited on the ISI-JCR-SCI list equals ECTS 10, with a maximal number of ECTS achieved by this way limited to 40;
- in order to start the second year of studies, the candidate must pass at least 3 of obligatory courses;
- in order to start the third year of studies, the candidate must pass all courses. Thus he/she fulfills the condition to apply for thesis;
- in order to submit the thesis to mentor for reading and reviewing (and consequent defense) the candidate must publish at least one paper in an international scientific journal of an impact factor (IF) cited on the ISI-JCR-SCI list (thus fulfilling the accreditation condition).

Apart from all these obligations, doctoral candidate is obliged to work in industrial research projects that educate him for the industrial environment (application of the course Organization and Methods of Scientific Research – OMSR) – Ph.D. title owner must be a leader in knowledge dissemination. Time to be spent for this type of work is directly determined by mentor and depends on the type of courses passed, as well as on candidate's engagement in lecturing.

OBLIGATORY COURSES

1.1 Advanced course of mathematics
- Partial differential equations
- Linear algebr

1.2 Numerical methods
1.3 Organization and methods of scientific research (OMSR) and communication rules and skills
2.1 Advanced course of Mechanics or Fluid mechanics

Laboratory – Experimental part of research in framework of Ph.D. thesis**.**

ELECTIVE COURSES

List of elective courses for position 1.4 – 27 courses

Vehicles design; Flow measurements; Analytical mechanics; Epistemology of science and technique; Tensor calculus; Linear system estimation; Stochastic processes and systems; Measurements A – Principal; Methods in design of complex systems; Experimental data acquisition and processing; Dynamics of ships; System effectiveness; Reliability of vehicles; Principles of modeling in process engineering; Explosive application; Production planning and management; Theory of hydrodynamic stability; Oscillations of mechanical systems; Dynamics of viscous fluids; Boundary layer theory; Material science and engineering; Airfoils and hydroprofiles; Modelling of transient processes; Flight mechanics; Fuels and some specific aspects of combustion; Combustion and pollution chemistry; Surface engineering

List of elective courses for positions 2.2 and 2.3 – 43 courses

Mechatronics in vehicles; Anisotropic plates and shells; Missile guidance and control systems; Modelling, optimization and forecasting in industrial engineering; Physical phenomena analogies; Stability of system motion; Multi-input multi-output system analysis and design; Time delay systems; Ship waves; Propulsion of projectiles; Environmental engineering science; Management of maintenance and quality system; Man-machine system design; Thermodynamics of chemical processes; Mechanics of bipedal motion; Dynamics of a system of rigid bodies; Power transmission of locomotives – control and optimisation; Thin walled beams; Developments in ship structural design; Turbomachinery flow phenomena – design of cascades and impeller blades; Product development in mechanical engineering; Mathematical methods in fluid dynamics (CFD); Advanced thermal cycles; Intelligent automation; Structural integrity and life; Topics on ship hydrodynamics; Numerical simulation of welding; Nonlinear strength problems of rail vehicles; Lifting surfaces; Nozzle design and flow analysis; Advanced course of fluid biomechanics; Mass, momentum and heat transfer theory; Mathematical modeling and simulation of drying processes and plants; Missile propulsion; Methods in design of process industry equipment; Flight dynamics; Aeronautical safeguarding; Advanced biomedical engineering; Advanced combustion equipment; Combustion modelling; Lubrication theories; Structural analysis of machines for mechanization; Dynamics of mining and construction machines.

List of elective courses for positions 3.1 and 3.2 – 64 courses

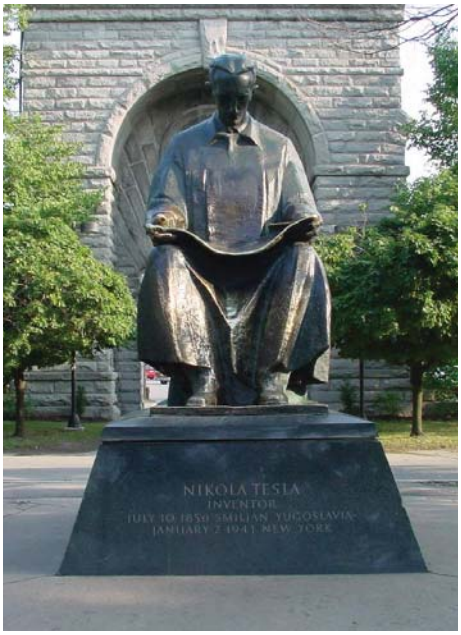
Performance analysis of manufacturing systems; Model and prototype tests of hydraulic machinery; Introduction to aerospace vehicles; Turbulent flows; Power plant modelling; Descriptive linear systems; Higher course of heat and mass transfer operations; Aero-hydrodynamics of sailing yachts; Computational methods in marine hydrodynamics; Advances in drying, wetting and spreading process; Organizational theory and practice; Rehabilitation biomechanics; Motion control of mechanical systems; Selected chapters in mechanics of robots; Mechanics of locomotor system; Multiphase flows; Magneto-hydrodynamics; Modelling of turbulent flows; Advanced methods for maintenance of rail vehicles; Computation solved and diagnostics of structures behaviour; Systems of artificial neural networks; Intelligent industrial robots; Mechanics of continuous media; Mechanics of variable mass systems; Wave induced loads on ships; Numerical methods in ship structural design; Turbomachinery flow phenomena – computational fluid dynamics; Waves in liquids; Logistics – advanced course; Aerodynamics and design of thermal turbomachinery; Mechatronics systems and adaptronics; High speed craft; Behaviour and reliability of materials during exploitation; Dynamic problems of railway vehicles; Microchannel flow; Computational multi-fluid dynamics (CMFD); Methods of design, construction, calculation and optimization of processes, plants, devices and equipment; Energy efficiency in buildings; Operations research – advanced course; Higher course of heat transfer apparatuses; Machining system testing and optimization; Higher course of mass transfer apparatuses; Waste management and research; Locomotion bioengineering; Industrial robots modelling and simulations; Optimization methods of machine systems; Steam boilers hydrodynamics; Coal dust preparation plants; Advanced

course on steam boilers processes; District heating; Industrial ventilation; Solar systems; Higher course in design pressure vessels; Design apparatus and pipelines under pressure; Aircraft production technology; Time-varying nonlinear systems; Advanced nanotechnology; Electronic circuits and systems; CFD in combustion; Measurement techniques in combustion; Failure diagnostics; Dynamics of material handling and conveying machines; Efficiency and reliability of weapons; Fire control and command information systems.

Monuments of Nikola Tesla

Belgrade

Niagara Falls



1 T = 1 Wb/m²

Tesla Roadster

University of Belgrade
Faculty of Mechanical Engineering

Bachelor Studies – ECTS 180

Master Studies – ECTS 120

Hours weekly	1st year		2nd year		3rd year		1st year		2nd year	
	1st	2nd	3rd	4th	5th	6th	1st	2nd	3rd	4th
1	Mathematics 1	Mathematics 2	Mathematics 3	Thermodynamics B	Fluid mechanics B	Electrical and electronics engineering	COURSE OF ELECTIVE MODULE 1.1.5	COURSE OF ELECTIVE MODULE 2.1.5	COURSE OF ELECTIVE MODULE 3.1.5	M.Sc. thesis (Diploma work) 4.9
2										
3										
4										
5										
6	Mechanics 1	Basics of strength of constructions	Mechanics 2	Mechanics 3	Numerical methods	Control engineering	COURSE OF ELECTIVE MODULE 1.2.5	COURSE OF ELECTIVE MODULE 2.2.5	COURSE OF ELECTIVE MODULE 3.2.5	
7										
8										
9										
10										
11	Constructive geometry and graphics	Engineering graphics	Machine elements 1	Machine elements 2	Manufacturing technology	Elective course 6.3.5	Mechanics M or Fluid mechanics M 1.3.5	COURSE OF ELECTIVE MODULE 2.3.5	COURSE OF ELECTIVE MODULE 3.3.5	
12										
13	Strength of materials									
14										
15										
16	Physics and measurements	Engineering materials 1	Engineering materials 2	Elective course 4.4.5	Elective course 5.4.5	Elective course 6.4.5	Thermo-dynamics M or Mechatronics 1.4.5	Elective course 2.4.5	Elective course 3.4.5	
17										
18		Basics of sociology and economics								
19										
20										
21	English 1	English 2	Elective course 3.5.5	Mechanical engineering praxis	Elective course 5.5.5	Final course with a report (B.Sc. work) 6.5.5	Elective course 1.5.5	Elective course 2.5.5	Elective course 3.5.5	
22										
23	Programming	Computational tools								
24										
25				Elective Skill praxis B 4.8				Skill praxis M of elective module 2.8		