**T E C H N I C A L  U N I V E R S I T Y  O F  G A B R O V O**
**FACULTY OF MECHANICAL AND PRECISION ENGINEERING**

Endorsed with Academic Council resolution
Record № 9 dated 29.05.2012.

Approved by
Rector /s/

# Q U A L I F I C A T I O N  R E F E R E N C E

Degree course: **COMPUTER TECHNOLOGIES IN MECHANICAL ENGINEERING**
Educational-qualification degree: **BACHELOR**
Field of higher education: **TECHNICAL SCIENCES**
Professional trend: 5.1 **MECHANICAL ENGINEERING**
Professional qualification: **MECHANICAL ENGINEER**

## ANNOTATION

This qualification reference specifies the vocational purpose as well as the requirements concerning training and prospective areas of professional realization of machine engineers who are bachelor degree holders.

## VOCATIONAL PURPOSE

Successful graduates who have taken bachelor degree in "Computer technologies in mechanical engineering" possess adequate theoretic knowledge and practical skills which determine their ability for:

- CAD design of machines and equipment in all fields of industry.
- Computer technologies in mechanical engineering.
- Introduction of modern computer systems for CAD and programming of CNC machines.
-Service as consultants and experts in developing technology and innovative projects in the area of mechanical engineering.
- Participation as organizers and managers or as experts in teams which manufacture, operate and maintain engineering equipment.
- Participation in teams dealing with engineering and marketing in the area of manufacturing and technology transfer.
- Pedagogical practice provided they have duly acquired license to teach/instruct.

## TRAINING REQUIREMENTS

Students in the Bachelor degree course follow their studies for four academic years in accordance with approved curriculum which was endorsed by the Academic Council. The course ends up with thesis defense which is written during the last semester of studies.

Training provides:

-acquisition of thorough overview of the professional trend and the major itself;

- mastering of a wide spectrum of theoretic knowledge and practical skills;
- adaptability skills to meet the challenges during professional realization;
- ability and skills for individual and team work;
- prerequisites for educational mobility and international comparison of acquired knowledge and skills.

**AREAS OF PROFESSIONAL REALIZATION**

Machine engineers who are successful graduates of the bachelor degree course are well able to follow career as:

Managers of manufacturing companies and units, centers for development and introduction of modern computer technologies, consultants in software developing companies, experts attached to companies and affiliations. They are also eligible to continue their studies in a Master's degree and doctoral degree courses.

This qualification reference was endorsed by the Faculty Council resolution, Record № 5 dated 15.05.2012.

Department Chair /s/ Dean /s/

**T E C H N I C A L  U N I V E R S I T Y  O F  G A B R O V O**
**FACULTY OF MECHANICAL AND PRECISION ENGINEERING**

Endorsed with Academic Council resolution
Record № 9 dated 29.05.2012

Approved by
Rector /s/

Updated with Academic Council resolution
Record № 9 dated 13.05.2014 and № 6 dated 03.02.2015

# C U R R I C U L U M

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Degree course: **COMPUTER TECHNOLOGY IN MECHANICAL ENGINEERING**
Academic degree: **BACHELOR**
Higher education area: **TECHNICAL SCIENCES**
Professional trend: 5.1 **MACHINE ENGINEERING**
Professional qualification: **MACHINE ENGINEER**
Form of training: **FULL-TIME**
Duration of training: **4 /FOUR/ YEARS**

| № | SUBJECTS TAUGHT | FORMS OF ASSESSMENT **E - EXAMINATION CA – CONTINUOUS ASSESSMENT** | COURSE-WORK | WORKLOAD IN NUMBER OF ACADEMIC HOURS | | | | WEEKLY DISTRIBUTION | TYPE OF SUBJECT | ECTS CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | LECT-URES | SEMI-NAR CLASSES | LABORATORY CLASS-ES | T / C | L + SC + LC | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | ***First Semester*** | | | | | | | | | |
| 1. | Calculus, part 1 | E | | 30 | 30 | 0 | 60 | 2+2+0 | C | 5/2.3 |
| 2. | Informatics | E | CW | 30 | 0 | 30 | 60 | 2+0+2 | C | 6/2.3 |
| 3. | Chemistry | E | | 30 | 0 | 15 | 45 | 2+0+1 | C | 4/1.7 |
| 4. | Engineering Graphics I | CA | CW | 15 | 0 | 30 | 45 | 1+0+2 | C | 5/1.7 |
| 5. | Materials Science | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 6/2.3 |
| 6. | Placement | | | 0 | 0 | 30 | 30 | 0+0+2 | C | 1/1 |
| 7. | Foreign Language | | | 0 | 30 | 0 | 30 | 0+2+0 | E | 3/1.1 |
| 8. | Physical Education | | | 0 | (30) | 0 | (30) | (0+2+0) | E | (3/1.1) |
| | ***First year, first semester*** | ***4 E 1*** CA | ***2 CW*** | ***135*** | ***60*** | ***135*** | ***330*** | ***9+4+9=22*** | | ***30/12.4*** |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| | ***Second Semester*** | | | | | | | | | |
| 9. | Calculus, part 2 | E | | 30 | 30 | 0 | 60 | 2+2+0 | C | 5/2.3 |
| 10. | Physics | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/2.3 |
| 11. | Mechanics, part 1 | E | CW | 30 | 30 | 0 | 60 | 2+2+0 | C | 6/2.3 |
| 12. | Technology of Engineering Materials | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 6/2.3 |
| 13. | Engineering Graphics II | CA | CW | 0 | 0 | 30 | 30 | 0+0+2 | C | 4/1.1 |
| 14 | Placement | | | 0 | 0 | 30 | 30 | 0+0+2 | C | 1/1 |
| 15. | Foreign Language | CA | | 0 | 30 | 0 | 30 | 0+2+0 | E | 3/1.1 |
| 16. | Physical Education | | | 0 | (30) | 0 | (30) | (0+2+0) | E | (3/1.1) |
| | ***First year, second semester*** | ***4 E 2CA*** | ***2 CW*** | ***120*** | ***90*** | ***120*** | ***330*** | ***8+6+8=22*** | | ***30/12.4*** |
| | ***Third Semester*** | | | | | | | | | |
| 17. | Calculus, part 3 | E | | 30 | 30 | 0 | 60 | 2+2+0 | C | 5/2.3 |
| 18. | Mechanics, part 2 | E | CW | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/1.7 |
| 19. | Strength of Materials | E | CW | 45 | 15 | 15 | 75 | 3+1+1 | C | 7/2.8 |
| 20. | Fluid Mechanics | CA | | 30 | 0 | 15 | 45 | 2+0+1 | C | 4/1.7 |
| 21. | Electrical Engineering and Electronics | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/2.3 |
| 22. | Computer Modeling and Technical Documentation | CA | | 15 | 0 | 30 | 45 | 1+0+2 | C | 4/1.7 |
| 23. | Physical Education | | | 0 | (30) | 0 | (30) | (0+2+0) | E | (3/1.1) |
| 24. | Foreign Language - specialized course | CA | | 0 | 60 | 0 | 60 | 0+4+0 | O | 5/2.3 |
| | ***Second year, third semester*** | ***4 E 2CA*** | ***2WP*** | ***180*** | ***45*** | ***120*** | ***345*** | ***12+3+8=23*** | | ***30/12.5*** |
| | ***Fourth Semester*** | | | | | | | | | |
| 25. | Theory of Machines and Mechanisms | CA | CW | 30 | 15 | 15 | 60 | 2+1+1 | C | 6/2.3 |
| 26. | Metrology and Instrumentation | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/2.3 |
| 27. | Cutting of Materials | E | | 45 | 0 | 30 | 75 | 3+0+2 | C | 7/2.8 |
| 28. | Machine Elements | E | | 45 | 0 | 30 | 75 | 3+0+2 | C | 7/2.8 |
| 29. | Thermodynamics | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/2.3 |
| 30. | Physical Education | | | 0 | (30) | 0 | (30) | (0+2+0) | E | (3/1.1) |
| 31. | Work Placement, part 1 | | | 0 | 0 | 0 | (120) | | O | (4/0) |
| | ***Second year, fourth semester*** | ***4 E 1CA*** | ***1 CW*** | ***180*** | ***15*** | ***135*** | ***330*** | ***12+1+9=22*** | | ***30/12.5*** |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| | ***Fifth Semester*** | | | | | | | | | |
| 32. | Machine Tools | E | CW | 45 | 0 | 30 | 75 | 3+0+2 | C | 7/2.8 |
| 33. | Cutting Tools | E | | 45 | 0 | 30 | 75 | 3+0+2 | C | 6/2.8 |
| 34. | Fundamentals of Mechanical Engineering Technologies | E | | 45 | 0 | 30 | 75 | 3+0+2 | C | 6/2.8 |
| 35. | Actuators and Drive Devices | E | | 30 | 0 | 15 | 45 | 2+0+1 | C | 5/1.7 |
| 36.1 | Computerized Diagnostics | CA | | 30 | 0 | 15 | 45 | 2+0+1 | E | 4/1.7 |
| 36.2 | Testing of Structural Elements | CA | | 30 | 0 | 15 | 45 | 2+0+1 | E | 4/1.7 |
| 37. | Machine Elements – project | CA | | | | | | | 3 | 2/0 |
| 38.1 | Project Management | CA | | 30 | 15 | 0 | 45 | 2+1+0 | E | 4/1.7 |
| 38.2 | Industrial Marketing | CA | | 30 | 15 | 0 | 45 | 2+1+0 | E | 4/1.7 |
| 39. | Physical Education | | | 0 | (30) | 0 | (30) | (0+2+0) | O | (3/1.1) |
| | ***Third year, fifth semester*** | ***4 E 2CA*** | ***1CW*** | ***195*** | ***0*** | ***120*** | ***315*** | ***13+0+8=21*** | | ***30/11.8*** |
| | ***Sixth Semester*** | | | | | | | | | |
| 40. | Computerized Control of Manufacturing Equipment | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/2.3 |
| 41. | Tooling Equipment and Machines | E | CW | 45 | 0 | 15 | 60 | 3+0+1 | C | 5/2.3 |
| 42. | Mechanical Treatment Technologies | E | | 45 | 0 | 30 | 75 | 3+0+2 | C | 6/2.8 |
| 43.1 | Non-conventional Methods and Machine Tools | E | | 30 | 0 | 30 | 60 | 2+0+2 | E | 5/2.3 |
| 43.2 | Technological Processes for CNC Machines | E | | 30 | 0 | 30 | 60 | 2+0+2 | E | 5/2.3 |
| 43.3 | Materials Utilized in Industry | E | | 30 | 0 | 30 | 60 | 2+0+2 | E | 5/2.3 |
| 44. | Computer-based Methods for Engineering Analysis | CA | | 0 | 0 | 45 | 45 | 0+0+3 | C | 4/1.7 |
| 45.1 | Transmission Phenomena and Processes in Mechanical Engineering | CA | | 30 | 0 | 0 | 30 | 2+0+0 | C | 3/1.1 |
| 45.2 | Assembly and Repair Technologies | CA | | 15 | 0 | 15 | 30 | 1+0+1 | E | 3/1.1 |
| 46. | Cutting Tools – project | CA | | | | | | | C | 2/0 |
| 47. | Work Placement, part 2 | | | 0 | 0 | 0 | (60) | | C | (2/0) |
| 48. | Physical Education | | | 0 | (30) | 0 | (30) | (0+2+0) | O | (3/1.1) |
| | ***Third year, sixth semester*** | ***4 E 3 CA*** | ***1CW*** | ***180 (165)*** | ***0 (0)*** | ***150 (165)*** | ***330 (330)*** | ***12+0+10=22 (11+0+11=22)*** | | ***30/12.5 (30/12.5)*** |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| | ***Seventh Semester*** | | | | | | | | | |
| 49. | CAM-based Mechanical Engineering | E | | 45 | 0 | 30 | 75 | 3+0+2 | C | 6/2.8 |
| 50. | Non-conventional Technologies in Mechanical Engineering | E | | 30 | 0 | 30 | 60 | 2+0+2 | C | 5/2.3 |
| 51.1 | Tool Manufacturing Technology | E | | 30 | 0 | 30 | 60 | 2+0+2 | E | 5/2.3 |
| 51.2 | Programming, Adjustment and Operation of CNC Machines | E | | 30 | 0 | 30 | 60 | 2+0+2 | E | 5/2.3 |
| 51.3 | Thermal Treatment | E | | 30 | 0 | 30 | 60 | 2+0+2 | E | 5/2.3 |
| 52. | CAD/CAM Systems for Mechanical Engineering Design | CA | | 30 | 0 | 45 | 75 | 2+0+3 | C | 6/2.8 |
| 53. | Technological Equipment | E | CW | 30 | 0 | 30 | 60 | 2+0+2 | C | 6/2.3 |
| 54. | Mechanical Treatment Technologies – project | CA | | | | | | | C | 2/0 |
| 55. | Physical Education | | | 0 | (60) | 0 | (60) | (0+4+0) | O | (5/2.3) |
| | ***Fourth year, seventh semester*** | ***4 E 2 CA*** | ***1CW*** | ***165*** | ***0*** | ***165*** | ***330*** | ***11+0+11=22*** | | ***30/12.5*** |
| | ***Eighth Semester*** | | | | | | | | | |
| 56. | CAM Systems in Mechanical Engineering | CA | | 40 | 0 | 50 | 90 | 4+0+5 | C | 7/3.0 |
| 57. | Safety Engineering | CA | | 20 | 0 | 10 | 30 | 2+0+1 | C | 2/1 |
| 58. | Computer-based Design of Technology and Tool Equipment | CA | | 30 | 0 | 30 | 60 | 3+0+3 | C | 4/2 |
| 59.1 | Economics and Management of Enterprise | CA | | 20 | 20 | 0 | 40 | 2+2+0 | E | 3/1.3 |
| 59.2 | Engineering logistics | CA | | 20 | 20 | 0 | 40 | 2+2+0 | E | 3/1.3 |
| 60. | Pre-graduation apprenticeship | | | | | | | | C | 4/0 |
| 61. | Graduation Thesis Work | | | | | | | | | 10/0 |
| | ***Fourth year, eighth semester*** | ***4 CA*** | | ***110*** | ***20*** | ***90*** | ***220*** | ***11+2+9=22*** | | ***30/7.3*** |
| | ***Total for the entire course of study*** | ***28 E 17 CA*** | ***10 CW*** | ***1280*** | ***245*** | ***1005*** | ***2530*** | ***89+17+70=176*** | | ***240/93.9*** |

**Compulsory elective module I includes:**
43.1 Non-conventional Methods and Machine Tools
51.1 Technology of Cutting Tool Manufacture
**Compulsory elective module II includes:**
43.2 Technological Processes for CNC Machines
51.2 Programming, Adjustment and Operation of CNC Machines
**Compulsory elective module III includes:**
43.3 Materials Utilized in Industry
51.3 Thermal Treatment

***ABBREVIATIONS USED:***

**C** – compulsory subjects
**E** – elective subjects
**O** – optional subjects

| SUBJECTS | | WORKLOAD | |
|---|---|---|---|
| Type | Number | Hours | % |
| C | 40 | 2235 | 88 |
| E | 8 | 295 | 12 |
| Total | 48 | 2530 | 100 |
| O | 2 | 105 | |

Note: The numbers quoted in column 11 under the abbreviations T / C refer to: T – total number of credits, C – credits from contact hours.

The curriculum was endorsed with Faculty Board resolution, Record No 5 dated 15.05.2012.

Department Chair /s/ Dean /s/