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|  | MINISTRY OF EDUCATION AND SCIENCE  TECHNICAL UNIVERSITY - VARNA  FACULTY OF SHIPBUILDING |  |  |

APPROVED

DEAN:................................

/ / Assoc.Prof. Eng. I. Hadzhidimov, PhD /

### SYLLABUS

Discipline „ ***Higher Mathematics-part******2***  ”, code: 9

Included in the Curriculum of the specialty: *MARINE ENGINEERING*

Professional field of study: *TRANSPORTATION,NAVIGATION AND AVIATION – 5.5*

Higher Education Qualification: *BACHELOR'S DEGREE*

Faculty, providing the organizational and methodological training:FACULTY OF SHIPBUILDING

Department, providing instruction on the discipline: *MATHEMATICS*

# **Excerpt from the curriculum**

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| No by order | Name of the discipline | Forms of assessment | | | | Auditorium workload | | | | | | Extracurricular activities | Student total workload | Credits |
| Examination | Continuous Assessment | Course project | Pass / Failed | Lectures | Seminars | | | Laboratory classes | Total hours |
| Seminar classes | Course project | Course work |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 9 | ***Higher Mathematics-part******2*** | \* |  |  |  | 30; |  |  |  | 30 | 60 | 75 | 135 | 5 |

Semester: SECOND

## ANNOTATION

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| The syllabus of Higher Mathematics-part 2 uses the knowledge which is obtained from the course of Higher Mathematics-part 1. It contains the following sections: integral calculus, ordinary differential equations, infinite series, function of a complex variable, theory of probability. The aim is to define the considered notions and their applications in the next topics of the course and in the engineering disciplines. Systems of computer algebra are used in the laboratory classes. These modern forms of education give students the opportunity to learn mathematics easily and consider it from another point of view. |

### A. Lectures (Topics)

|  |  |
| --- | --- |
| Topic 1. Indefinite integral. | 3 hours |
| Topic 2. Definite integral. | 2 hours |
| Topic 3. Applications of the definite integral. | 1 hours |
| Topic 4. Improper integrals. | 1 hours |
| Topic 5. Double integral. | 3 hours |
| Topic 6. Line integrals. Green’s formula. | 2 hours |
| Topic 7. Ordinary differential equations. General notions. Initial value problem. Separable differential equations. First-order linear differential equations. | 2 hours |
| Topic 8. Higher-order differential equations. Nonhomogeneous ODE, Lagrange method. | 2 hours |
| Topic 9. Infinite number series. | 2 hours |
| Topic 10. Power series | 2 hours |
| Topic 11. Fourier series and Fourier integral | 2 hours |
| Topic 12. Complex numbers. Elementary functions of a complex variable. | 3 hours |
| Topic 13. Random events. Definition of the probability of an event. | 1 hour |
| Topic 14. Probability of sum and product of events. Total probability theorem and Bayes’theorem. | 2 hours |
| Topic 15. Random variables. Some important probability distributions. Numerical characteristics. | 2 hours |

### Total: 30 hours

### B. Seminars

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| None |  |

### Total: 0 hours

### C. Laboratory classes

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| --- | --- |
| Topic 1. Indefinite integral. | 3 hours |
| Topic 2. Definite integral. | 3 hours |
| Topic 3. Applications of the definite integral. | 2 hours |
| Topic 4. Double integral. | 2 hours |
| Topic 5. Line integrals. Green formula. | 2 hours |
| Topic 6. First-order ordinary differential equations, Separable differential equations. First-order linear differential equations. | 2 hours |
| Topic 7. Second-order linear differential equations. | 2 hours |
| Topic 8. Infinite number series. | 2 hours |
| Topic 9. Power series | 2 hours |
| Topic 10. Fourier series. | 3 hours |
| Topic 11. Complex numbers. Elementary functions of a complex variable. Exponential function, trigonometric functions, Logarithmic function. | 2 hours |
| Topic 12. Random events. Classical definition about probability. | 1 hour |
| Topic 13. Probability of sum and product of events. Total probability theorem and Bayes’theorem. | 2 hours |
| Topic 14. Random variables. Probability distributions. Number characteristics. | 2 hours |

### Total: 30 hours

### D. Practical Training

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| NONE |  |

### Total: 0 hours

### E. Course Project

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| NONE |  |

### Total: 0 hours

### F. Forms and organisation of the assessment throughout the semester

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| --- | --- |
| Forms of assessment throughout the semester | Points– К1 |
| Achievement test 1 | 50 |
| Achievement test 2 | 50 |
| Total | 100 |

### G. Type of assessment (procedure)

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| --- | --- |
| Type of assessment | Points – К2 |
| Exam - written | 100 |

Final assessment points: К= 0,4 ×K1+ 0,6 ×К2

### H. Reference

1. Khan academy: www.khanacademy.org/math
2. Lamar University math notes: tutorial.math.lamar.edu
3. Wolfram math world: mathworld.wolfram.com

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| Author :....................................  / Assoc. Prof. Vsevolod Ivanov, PhD / |
| The programme was discussed at a Department Council meeting of the Department of *MATHEMATICS*, protocol № 1/05.09.2017 .  Head of Department ...................................  /Assist. Prof. Meline Aprahamian/  The programme was approved at a Faculty Council meeting of the Department of MATHEMATICS, PHYSICS AND LANGUAGE EDUCATION, protocol №2/07.09. 2017         Director :......................................  /Assoc.Prof. Tsanko Genchev, PhD/ |
| The programme was discussed at a Department Council meeting of the Department of „*NAVAL ARCHITECTURE AND MARINE ENGINEERING*“, protocol №    Head of Department :.........................  /Assoc. Prof. Eng. Irina Kostova, PhD/ |
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| The programme was approved at a Faculty Council meeting of the Faculty of SHIPBUILDING, protocol №                          Dean :......................................                                 /Assoc.Prof. Eng. I. Hadzhidimov, PhD/ |
| Agreed with :....................................  / / |
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Code: 9 „ **Mathematics-part 2**  ”

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| ECTS credits: 5  Forms of assessments: Exam | Number of hours per week: 2+0+2  Types of assessment: Exam - written |
| Department, providing instruction on the discipline:  Department: *MATHEMATICS*  *DEPARTMENT OF MATHEMATICS, PHYSICS AND LANGUAGE EDUCATION* | |

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| Lecturer: Assoc. Prof. Vsevolod Ivanov, PhD  Department: *MATHEMATICS*  Tel. +359 52 383 398  е-mail: vsevolod.ivanov@tu-varna.bg |

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| Annotation: The syllabus of Higher Mathematics-part 2 uses the knowledge which is obtained from the course of Higher Mathematics-part 1. It contains the following sections: integral calculus, ordinary differential equations, infinite series, function of a complex variable, theory of probability. The aim is to define the considered notions and their application in the next topics of the course and in the engineering disciplines. Systems of computer algebra are used in the laboratory classes. These modern forms of education give students the opportunity to learn mathematics easily and consider it from another point of view. |
| Main issues of the syllabus content :   * Integral calculus * Differential equations * Series * Complex numbers and function of a complex variable * Theory of probability |
| Content presentation: lectures, laboratory classes and tutorials |