## SYLLABUS

1. Data about the program of study

| 1.1 | Institution | The Technical University of Cluj-Napoca |
|---|---|---|
| 1.2 | Faculty | Automation and Computer Science |
| 1.3 | Department | Mathematics |
| 1.4 | Field of study | Electronics and Telecommunications Engineering |
| 1.5 | Cycle of study | License |
| 1.6 | Program of study/Qualification | Telecommunications Technologies and Systems/ Engineer, Applied Electronics/ Engineer |
| 1.7 | Form of education | IF (Full-time learning) |
| 1.8 | Subject code | TST-E09.00, EA-E09.00 |

2. Data about the subject

| 2.1 | Subject name | Special Mathematics | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.2 | Subject area | Mathematics | | | | | | |
| 2.3 | Course responsible/lecturer | Prof. dr. Dorian Popa | | | | | | |
| 2.4 | Teachers in charge of applications | Prof. dr. Dorian Popa | | | | | | |
| 2.5 | Year of study | I | 2.6 | Semester | 2 | 2.7 Assessment | verification | 2.8 Subject category | DF/DOB |

| Year/ Sem. | Type of discipline | Course | Applications | | | Course | Applications | | | Ind. study | TOTAL | Credits | Form of assessment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [hours/week] | | | | [hours/sem.] | | | | | | |
| | | | S | L | P | | S | L | P | | | | |
| I/2 | Special Mathematics | 2 | 2 | | - | 28 | | 28 | - | 64 | 120 | 4 | **Exam** |

| **Acquired competences** : |
|---|
| **Acquired skills** (what the student is able to do): |
| Notions and concepts concerning, line integrals, multiple integrals, surface integrals and relations between them, complex functions – differentiation and integration. |
| **Acquired abilities**: (what type of equipment/instruments/software the student is able to handle) |
| ■ To operate with line integrals <br> ■ To operate with multiple integrals <br> ■ To operate with surface integrals <br> ■ To operate with complex functions |

| **Prerequisites ( if necessary)** |
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| Notions on mathematical analysis, algebra and trigonometry from high school |

| **A. Course/Lecture** (course/lecture titles) |
|---|
| Course 1 – Line integrals of the first kind <br> Course 2 – Line integrals of the second kind <br> Course 3 – Differential forms <br> Course 4 – Measurable sets in $R^n$ <br> Course 5   The Riemann integral in $R^n$ <br> Course 6 – Evaluation of multiple integral by iteration <br> Course 7 – Change of variables in multiple integrals <br> Course 8 – Surface integrals of the first kind. <br> Course 9 – Surface integrals of the second kind. <br> Course 10 Integral formulas: Green, Stokes, Gauss-Ostrogradski <br> Course 11 –Holomorphic functions. Cauchy-Riemann equations <br> Course 12 – Complex integral <br> Course 13 – Taylor series. Laurent series <br> Course 14- Residues theorem |

| **B1. Applications** – **Laboratory** (list of laboratories), **Seminar** (contents), **Project** (project contents) | |
|---|---|
| 1 | Seminar 1 – Line integrals of the first kind <br> Seminar 2 – Line integrals of the second kind <br> Seminar 3 – Differential forms |

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|---|
| Seminar 4 – Measurable sets in $R^n$ <br> Seminar 5 - The Riemann integral in $R^n$ <br> Seminar 6 – Evaluation of multiple integral by iteration <br> Seminar 7 – Change of variables in multiple integrals <br> Seminar 8 – Surface integrals of the first kind. <br> Seminar 9 – Surface integrals of the second kind. <br> Seminar 10 - Integral formulas: Green, Stokes, Gauss-Ostrogradski <br> Seminar 11 –Holomorphic functions. Cauchy-Riemann equations <br> Seminar 12 – Complex integral <br> Seminar 13 – Taylor series. Laurent series <br> Seminar 14- Residues theorem |
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**C. Individual study** (reference study contents, synthesis materials, projects, applications etc.)

2 synthesis reports
12 sets of problems (the preparation part in every laboratory)
3 sets of problems (course homework)

| Individual study structure | Course study | Problem solving, laboratory, project | Applications preparation | Examination time | Additional reference study | Total no. of individual study hours |
|---|---|---|---|---|---|---|
| Hours | 28 | 6 | 18 | 3 | 9 | 64 |

| **References** ( Textbooks, courses, laboratory manual, exercise book) |
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| T.Apostol, Mathematical Analysis, Addison-Wesley Publishing Company, 1981. <br> S.Lang, Undegraduate Analysis, Springer, 1997. <br> D. Popa, Calcul integral, Editura Mediamira, 2005. |

| **Final evaluation** | |
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| Evaluation method | Writen paper – 3 hours containing theory and problems. After 7 courses partial evaluation (3 hours) |
| Mark components | Seminar S <br> Theory T <br> Problems P |
| Mark computation | N=0,2S+0,2T+0,6P |

Date of filling in    Course responsible               Teachers in charge of applications
18.03.2015          Prof. Dorian POPA, PhD            Prof. Dorian POPA, PhD

Date of approval in the department                      Head of department
18.03.2015                                    Prof. Mircea IVAN, PhD