# SYLLABUS

## 1. Data about the program of study

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| 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 | Bachelor of Science |
| 1.6 | Program of study/Qualification | Telecommunications Technologies and Systems/ Engineer, Applied Electronics/ Engineer |
| 1.7 | Form of education | Full time |
| 1.8 | Subject code | TST-E01.00, EA-E01.00 |

## 2. Data about the subject

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.1 | Subject name | | | | | Mathematical Analysis | | | | | |
| 2.2 | Subject area | | | | | Mathematics | | | | | |
| 2.3 | Course responsible/lecturer | | | | | Prof. mat. Dorian POPA, PhD | | | | | |
| 2.4 | Teachers in charge of applications | | | | | Prof. mat. Dorian POPA, PhD | | | | | |
| 2.5 | Year of study | I | 2.6 | Semester | 1 | 2.7 | Assessment | Exam | 2.8 | Subject category | DF/ DI |

## 3. Estimated total time

| Year/ Sem. | Subject name | No. of weeks | Course | Applications | | | Course | Applications | | | Indiv. study | TOTAL | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | [hours/week] | | | | [hours/sem.] | | | | | | |
| | | | | S | L | P | | S | L | P | | | |
| I / 1 | Mathematical Analysis | 14 | 2 | 2 | | | 28 | 28 | | | 44 | 100 | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3.1 | Number of hours per week | 4 | 3.2 | of which, course | 2 | 3.3 | applications | 2 |
| 3.4 | Total hours in the curriculum | 42 | 3.5 | of which, course | 28 | 3.6 | applications | 28 |

| Individual study | Hours |
|---|---|
| Manual, lecture material and notes, bibliography | 10 |
| Supplementary study in the library, online and in the field | - |
| Preparation for seminars/laboratory works, homework, reports, portfolios, essays | 28 |
| Tutoring | 3 |
| Exams and tests | 3 |
| Other activities | 0 |

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|---|---|---|
| 3.7 | Total hours of individual study | 44 |
| 3.8 | Total hours per semester | 100 |
| 3.9 | Number of credit points | 4 |

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| **Acquired competences** : |
| **Acquired skills** (what the student is able to do): |
| Notions and concepts concerning sequences, series, power series, complex functions, trigonometric and Fourier series, metric spaces, partial derivatives, local extrema, conditional extrema, implicit functions. |
| **Acquired abilities**: (what type of equipment/instruments/software the student is able to handle) |
| ■ To operate with numerical and functions series.<br>■ To operate with the concepts of metric spaces.<br>■ To operate with partial derivatives and the differential of a function.<br>■ To determine the local extrema and the conditional extrema of functions.<br>■ To operate with implicit functions. |

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| **Prerequisites ( if necessary)** |

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| Elementary notions on mathematical analysis, algebra and trigonometry. |

| **A. Course/Lecture** (course/lecture titles) | |
|---|---|
| | Course 1 – The sets R and C. Sequences.<br>Course 2 –Series of real and complex numbers.<br>Course 3 – Series with positive terms.<br>Course 4 – Sequences and series of functions. Power series.<br>Course 5 Taylor formula. Taylor series.Complex elementary functions.<br>Course 6– Trigonometric series. Fourier series.<br>Course 7 – Metric spaces. Topology of a metric space.<br>Course 8 - Partial derivatives. The directional derivative.<br>Course 9 –The differential of a function.<br>Course 10 – Local extrema of a function.<br>Course 11 – Implicit functions.<br>Course 12- Conditional extrema.<br>Course 13 – Improper integrals.<br>Course 14 – Integrals delpendent on parameters. |

| **B1. Applications** – **Laboratory** (list of laboratories), **Seminar** (contents), **Project** (project contents) | |
|---|---|
| 1 | Seminar 1 – Sequences of real and complex numbers.<br>Seminar 2 – Series of real numbers.<br>Seminar 3 – Series of complex numbers<br>Seminar 4 – Series of functions.<br>Seminar 5 – Power series. Applications.<br>Seminar 6 – Complex functions. Applications.<br>Seminar 7 – Trigonometric series. Fourier Series.<br>Seminar 8 – Metric spaces. Applications<br>Seminar 9 – Partial derivatives<br>Seminar 10 – Problems with partial derivatives.<br>Seminar 11 – Local extrema.<br>Seminar 12 – Implicit functions<br>Seminar 13 – Conditional extrema.<br>Seminar 14 – Generalized integrals. |
| **C. Individual study** (reference study contents, synthesis materials, projects, applications etc.) | |
| 2 synthesis reports<br>12 sets of problems (the preparation part in every laboratory)<br>3 sets of problems (course homework) | |
| **References** ( Textbooks, courses, laboratory manual, exercise book) | |
| 1. Dorian Popa, Calculus – Mediamira Cluj-Napoca, 2006.<br>2. O. Stănăşilă, Analiză matematică, EDP Bucureşti, 1981.<br>3. N. Vornicescu, D.M.Ivan, D. Popa, Calcul diferenţial, Editura Mediamira, 2004.<br>4. M. Ivan, Calculus, Mediamira Cluj-Napoca, 2004.<br>5. G.N.Berman, A problem book in Mathematical Analysis, Mir Publisher , Moscow,1977. | |

| **Final evaluation** | |
|---|---|
| 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 1.10.2018

Course responsible
Prof. Dorian POPA, PhD

Teachers in charge of applications
Prof. Dorian POPA, PhD