

Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ING251	Advanced Mathematics I	3	2	1	0	2.5	4

Prerequisites

Admission Requirements

Language of Instruction French

Course Type Compulsory

Course Level Bachelor Degree

This course is the continuation of the Math I course.
In this context, the objectives of this course are:

Objective	<ul style="list-style-type: none">- Demonstrate to the students the classical techniques [integration by parts and change of variables] to calculate a primitive,- Teach students to handle the comparison relations "to be negligible in front of" and "to be equivalent to" on functions,- Teach how to find a "simple" equivalent of a point function to find its limit,- Demonstrate the different convergence criteria for the integrals of positive functions,- Explain in which cases a limited expansion makes it possible to determine the nature of an integral,- Demonstrate the different convergence criteria for series with positive terms,- Explain in which cases a limited development makes it possible to determine the nature of a series
Content	<ol style="list-style-type: none">1. Primitives: Definition, properties and first examples.2. Primitives: Calculation rules [integration by parts and change of variable]3. Comparison relations: function negligible in front of another, function equivalent to another4. Comparison relations: calculation rules, comparative growth of logarithms, powers and exponential in 0 and infinity.5. Comparison relations: Application to the search for limits.6. Generalized integrals: definition, properties and first examples [Riemann integrals and Bertrand integrals].7. Generalized integrals: comparison theorems for positive functions.8. Generalized integrals: case of functions of any sign.9. Partial Examination / Ara sinav10. Generalized integrals: Integrals depending on a parameter11. Numerical series: definition, properties and first examples [Riemann series and Bertrand series].12. Numerical series: comparison theorems for series with positive terms.13. Numerical series: Case of series of any sign. Convergence criterion of alternating series.14. Digital Series: Series depending on a parameter
References	<ol style="list-style-type: none">1. Lectures notes and worksheets2. http://braise.univ-rennes1.fr/braise.cgi3. http://www.unisciel.fr

Theory Topics

Week	Weekly Contents
1	Reminders: Derivation, usual functions and limited developments
2	Primitives: Definition, Interpretation and Properties
3	Primitives: Calculation methods (integration by part)
4	Primitives: Calculation methods (integration by part)
5	Primitives: Calculation methods (cases requiring several successive methods)
6	Comparison of functions: Definition and interpretation
7	Comparing functions: Practical search for the equivalent of a function
8	Comparing functions: Practical search for the equivalent of a function (continued)
9	Midterm exam
10	Generalized integrals: Definition, Interpretation and Properties
11	Generalized integrals: Case of positive functions
12	Generalized integrals: Case of functions of any sign
13	Generalized integrals: Semi-convergent integrals
14	Preparing for the final exam