## 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
Objective	This course is the continuation of the Math I course. In this context, the objectives of this course are:
	- Demonstrate to the students the classical techniques [integration by parts and change of variables] to calculate a primitive,
	on functions,
	<ul> <li>Teach how to find a "" simple "" equivalent of a point function to find its limit,</li> <li>Demonstrate the different convergence criteria for the integrals of positive functions,</li> <li>Explain in which cases a limited expansion makes it possible to determine the nature of an integral,</li> <li>Demonstrate the different convergence criteria for series with positive terms,</li> <li>Explain in which cases a limited development makes it possible to determine the nature of a series</li> </ul>
Content	<ol> <li>Primitives: Definition, properties and first examples.</li> <li>Primitives: Calculation rules [integration by parts and change of variable]</li> <li>Comparison relations: function negligible in front of another, function equivalent to another</li> <li>Comparison relations: calculation rules, comparative growth of logarithms, powers and exponential in 0 and infinity.</li> <li>Comparison relations: Application to the search for limits.</li> <li>Generalized integrals: definition, properties and first examples [Riemann integrals and Bertrand integrals].</li> <li>Generalized integrals: comparison theorems for positive functions.</li> <li>Generalized integrals: case of functions of any sign.</li> <li>Partial Examination / Ara sinav</li> <li>Generalized integrals: Integrals depending on a parameter</li> <li>Numerical series: comparison theorems for series with positive terms.</li> <li>Numerical series: Case of series of any sign. Convergence criterion of alternating series.</li> <li>Digital Series: Series depending on a parameter</li> </ol>
References	<ol> <li>Lectures notes ans worksheets</li> <li>http://braise.univ-rennes1.fr/braise.cgi</li> <li>http://www.unisciel.fr</li> </ol>

## **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 (change of variable)
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