Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ING253	Advanced Mathematics I	3	2	1	0	2.5	5

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, - 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	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 another 4. 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 sinav 10. Generalized integrals: Integrals depending on a parameter 11. 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	1. Lectures notes ans worksheets 2. http://braise.univ-rennes1.fr/braise.cgi 3. 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

Week	Weekly Contents
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