Course Code	MTH200
Course Name	Introduction to Mathematical Logic
Credits	4
Course Offered to	UG
Course Description	This is an introductory course in mathematical logic. The subject is of interest to students in both Mathematics and Computer Science. Topics covered include propositional logic, first order logic, consistency, satisfiability, soundness, completeness, and compactness. We will also discuss some basic set theory and axiomatic number theory (Peano's arithmetic). If time permits we will discuss the famous incompleteness theorems of Gödel.

Pre-requisites		
Pre-requisite (Mandatory)	**Pre-requisite (Desirable)**	**Pre-requisite(other)**

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)			
CO1	**CO2**	**CO3**	**CO4**
Students will be able to translate formulas of propositional logic to and from natural language statements, determine the satisfiability and validity of propositional formulas via truth-tables.	Students will be able to translate formulas of first-order logic to and from natural language sentences, check the satisfiability and validity of formulas in a domain.	Students will be able to prove and apply the soundness, completeness and compactness theorems for propositional and first-order logics.	Students will be able to appreciate the use logic in formalizing mathematics through the introduction to formal number theory (Peano's arithmetic) and set theory.

Weekly Lecture Plan			
Week Number	**Lecture Topic**	**COs Met**	**Assignment/Labs/Tutorial**
Week 1	Introduction, language of propositional logic, well-formed formulas, induction.	CO1	
Week 2	Truth-assignments, truth-tables, parsing, alternative notations, the deduction theorem.	CO1, CO3	HW1
Week 3	Soundness and completeness of propositional logic.	CO1, CO3	HW2
Week 4	Compactness theorem for propositional logic.	CO3	HW3
Week 5	Language of first-order logic, well-formed formulas, structures.	CO2	HW4
Week 6	Satisfiability and validity of formulas, models, logical implication, definability in a structure, equality.	CO2	HW5
Week 7	Consistency, soundness for first-order logic.	CO2, CO3	HW6

Week 8	Completeness for first-order logic.	CO3	HW7
Week 9	Compactness theorem for first-order logic, applications of compactness theorem, proof systems.	CO3	HW8
Week 10	Theories and models, formal number theory.	CO4	HW9
Week 11	Formal number theory, naïve set theory, cardinality, axiom of choice.	CO4	HW10
Week 12	Set theory - naïve to axiomatic.	CO4	HW11
Week 13	Additional topics to be chosen from computability, the halting problem, and Gödel's incompleteness theorems.	CO4	HW12
*Please insert more rows if required			

Weekly Lab Plan			
Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)
*Please insert more rows if required			

Assessment Plan	
Type of Evaluation	**% Contribution in Grade**
Tutorials (best 10 out of 12)	30
Midsem	30
Endsem	40

Resource Material	
Type	**Title**
Textbook 1	A Mathematical Introduction to Logic (2nd Edition) by Herbert B. Enderton
Textbook 2	First Order Mathematical Logic by Angelo Margaris