AMITY UNIVERSITY
HARYANA

Established vide Government of Haryana Act No.10 of 2010

AUH/ASAS/BOS/0004/2018

Feb 5, 2018

NOTICE

The ASAS, BOS meeting will be held on Feb 5, 2018 from 11:00 am at room no. D-311, ASAS, AUH.

Agenda of the meeting is enclosed please.

Dr. A. K. Yadav
Head of Institute (HOI), ASAS, AUH

To:
VC
DVC
PVC
Dean Science and Technology
All members of the BOS

AMITY UNIVERSITY
HARYANA

Established vide Government of Haryana Act No.10 of 2010

BOARD OF STUDIES MEETING

DATE	Feb 5, 2018

TIME	11:00AM

VENUE:	D-BLOCK, 3RD FLOOR, ROOM NO. 311 AMITY SCHOOL OF APPLIED SCIENCES AMITY UNIVERSITY HARYANA AMITY EDUCATION VALLEY PANCHGAON (MANESAR)- 122413 GURGAON

Following members were present in the BOS meeting.

Sr. No	Name		Sign
1	Dr. A. K. Yadav	Chairman	
EXTERNAL EXPERTS			
1	Dr. R. K. Sharma	Member	R. K. Sharma.
INTERNAL EXPERTS			
Department of Applied Mathematics			
1	Dr. N. M. Chadha	Convener	
2	Dr. Subhra Das	Member	
3	Dr. Vijay Kumar	Member	
4	Dr. Nahid Fatima	Member	
5	Dr. Dimple Singh	Member	
6	Dr. Sunita Daniel	Member	
7	Dr. Sunita Kumawat	Member	- on leave -
8	Mr. Amit Sharma	Member	
9	Ms. Reeta Bhardwaj	Member	
10	Ms. Sarika Jain	Member	
11	Ms. Shweta Rana	Member	

AMITY UNIVERSITY
HARYANA

Established vide Government of Haryana Act No.10 of 2010

Amity School of Applied Sciences

Board of Studies

Date: 5-Feb-2018

Chairman: Dr. A. K. Yadav,
Director, ASAS.

Internal Members

Convener: Dr. N. M. Chadha

Members:

1. Dr. Subhra Das
2. Dr. Vijay Kumar
3. Dr. Dimple Singh
4. Ms. Sarika Jain
5. Dr. Sunita Kumawat
6. Dr. Nahid Fatima
7. Dr. Sunita Daniel
8. Mr. Amit Sharma
9. Ms. Reeta Bhardwaj
10. Ms. Shweta Rana

External Member

1. Prof. (Dr.) R. K. Sharma,
   Professor, Department of Mathematics,
   IIT Delhi.

Syllabus Revision

Summary Report

The aim of conducting this BOS is update the syllabus and to bring consistency and coherence between different modules in syllabi for various allied courses where faculty of mathematics department is involved.

Syllabi of various allied courses are thoroughly revised and discussed among concerned faculty members across various departments. Namely, following faculty members participated in revising the syllabi: Dr N M Chadha (HOD, Maths Deparment), Dr. A.K. Yadav (Director, ASAS), Dr. R. K. Thakur (HOD, Physics, Dy. Director ASAS), Dr Vijay Kumar, Dr Sunita Danial, Dr Nahid Fatima, Dr Dimple Singh, Ms Shweta Rana, Mr Reeta Bhardwaj, Mr. Amit Sharma, Dr Monika Chaudhary (Director of Optometry), Dr. Seema Pathak (HOD, Chemistry Deptt.), Dr Shalini Bajaj (HOD,CSE), Ms Yojana (Coordinator, BCA), Dr Sudip Majumdar (Co-ordinator, Biochem), Dr Bhuvnesh Yadav (Cordinator,FS), Dr Richa Rohatgi (Cordinator,FS).

Following courses are modified and provides a justification of modification(s)

Sr. No	Changes proposed by	Course modified.	Checked by
1	Dr. A. K. Yadav	(i)M.Tech-AIR, B.Tech-I –AM, B.Tech II Engg. Maths II	Dr. N. M. Chadha
2	Dr. N M Chadha	B.Sc –(I Sem) Physics	Dr. R.K Thakur
3	Dr Nahid Fatima	(i)B.A.Economics (ii)B.Sc.F.S	Dr. Meenal Jagtap
4	Dr. Sunita Danial	(i) M.Sc.-BCH Bioinformatics and Biostatistics	Dr. Seema Pathak, Dr. Sudip, Dr. Anurag
5	Dr.Shweta Rana	(i) B.Sc-IT/BCA/MCA/B.Tech-Discrete Mathematics (ii) Numerical Methods	Ms. Yojana Arora
6	Ms.Reeta Bhardwaj	(i) B.Sc.Chem-II-AM (ii) B.Sc.-II ESC-II –AM (iii) B.Sc.BLS-II-AM	Dr. Seema Pathak, Dr. Anurag
7	Dr Vijay Bhardwaj	B.Tech.IV-Numerical Methods	Dr. N. M. Chadha
8	Dr Dimple Singh	(i) Applied Mathematics-BCA-I,II Sem, (ii) A Basic Course in Statistics and Probability Theory(B.Opt)	Ms. Yojana Arora, Dr. Shalini Dr. Monika

5/2/18 5/2/18 R.K. Sharma

Mathematics II

For Earth Sciences

Course Code: **Credit Units: 02**

Course objective: To make the students explore the basic concepts of mathematics and statistics which are relevant for branches of earth sciences.

Unit I

Introduction, integration of few standard functions, integration by parts, partial fractions, integration by parts, Definite integrals and their properties, applications of integrals such as area of curves. Evaluation of double, triple integrals; Simple applications to area and volume

Unit II

Statistics: Frequency and distribution; Arithmetic mean, Median, Partition values, Mode, Variance and standard deviation; Curve fitting; Principle of least square; Linear regression.

Unit III

Probability: Introduction to Probability; Addition and multiplication theorem of Probability; Random variables and Probability distribution; Expected values; Binomial distribution; Poisson distribution & Normal distribution and their application.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. P. Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I &II.Muhil Publishers, Chennai
2. Shaum's Series outlines of Statistics

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APPLIED MATHEMATICS-II

For BSc Chem. Sem. II

Course Code: CHY2205 **Credit Units: 02**

Course Objective: To Explore the Fundamental Concepts of Mathematics

Course Contents:

Module I: Integral Calculus
Introduction, integration of few standard functions, partial fractions, integration by parts, Definite integrals and their properties, Evaluation of double and triple integrals, Simple applications to calculate area, volume of curves and surfaces.

Module II: Vector Analysis
Scalar point functions - Vector point functions, Gradient, divergence, curl, properties of scalar and vector point functions, Gauss, Stoke's and Green's theorems (without proofs), Simple problem based on these Theorems.

Module III: Statistical methods
Collection, classification and tabulation of data, Bar diagrams, pi diagrams, histograms, frequency curve and polygon, measure of central tendency, mean, median, mode, measure of dispersion, range, mean deviation, standard deviation, curve fitting.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

1. P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II. Muhil Publishers, Chennai
2. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol.I & II.Tata McGraw Hill, New Delhi.
3. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
4. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
5. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.

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Mathematics II

Course Code: BLS 2205 **Credit Units: 03**

Course objective: To make the students explore the basic concepts of mathematics and statistics which are relevant for branches of earth-sciences.

Unit I

Introduction, integration of few standard functions, integration by parts, partial fractions, integration by parts, Definite integrals and their properties, Evaluation of double and triple integrals, Simple applications to calculate area, volume of curves and surfaces.

Unit II

Statistics: Frequency and distribution; Arithmetic mean, Median, Partition values, Mode, Variance and standard deviation; Curve fitting; Principle of least square; Linear regression.

Unit III

Probability: Introduction to Probability; Addition and multiplication theorem of Probability; Random variables and Probability distribution; Expected values; Binomial distribution; Poisson distribution & Normal distribution and their application.

Examination Scheme:

Components	A	CT	HA	EE
Weightage (%)	5	15	10	70

A: Attendance, CT: Class Test, HA: Home Assignment, EE: End Semester Examination;

Suggested Readings

1. P. Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I &II.Muhil Publishers, Chennai

2. Shaum's Series "outlines of Statistics:

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A Basic Course in Statistics and Probability Theory
For B. Optometry

Course Code: OPT 2108 **Credit Units: 02**

Course Objective:
The objective of this course is to provide students with an understanding of basic concepts of Statistics and Probability Theory in the Medical and Health Sciences.

Course Contents:

Module I: Statistical Method

Collection, classification and tabulation of Data, Bar Diagrams and pi diagrams, Histogram, Frequency curve and Frequency Polygon, mean ,median, mode, standard deviation.

Module II: Correlation and Regression analysis
Relation between two variables, Scatter diagram, definition of correlations, curve fitting, principles of least squares, Two regression lines, Karl Pearson's coefficient of correlation, Rank correlation, tied ranks.

Module III: Probability Theory:
Random experiments, Sample space, Probability, conditional probability, Baye's theorem, Random variable, (discrete and continuous), Probability Distribution function (for continuous and random variable),Probability density function, cumulative probability function, Mathematical expectation, Variance.

Examination Scheme:

Components	CD	CT1	SA	A	EE
Weightage	5	10	10	5	70

(CD= Class Discussion, CT 1= Class Test, SA= Short Assignments, A= Attendance. EE= External Examination)

Text & References:

- Vijai Basotia (2008). Fundamentals of Statistics. Shree Niwas Publications
- Fundamentals of Biostatistics by Irfan A Khan
- An introduction to Biostatistics By PSS Sunder Rao
- Introduction to the practice of Statistics by Mooore and Mccabe
- Gupta &Kapoor-Fundamentals of Mathematical Statistics-Sultan Chand

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MATHEMATICS – I for BCA I

Course Code:

L-T-P : 2-1-0 **Credit Units : 03**

Course Objective:
The objective of this course is to provide an introduction to the fundamentals and concepts of basic mathematics covering sets, functions, differentiation, integration, differential equations, vectors and matrices. This course aims to assist the students to develop confidence in handling mathematical concepts and techniques and to understand the principles and Concept of differential Calculus.

Course Contents:

Module I: Matrices and Determinants
Definition of Matrix, Sub matrix, types of Matrices such as Symmetric, Asymmetric, Hermitian and skew-Hermitian, Square, Diagonal Matrices, Singular and Nonsingular matrices and their properties, Operations on matrices: Addition, Subtraction, Multiplication of Matrices, Determinant of Square Matrix, System of linear equations, Solution by Cramer's rule and Gauss Elimination method.

Module II: Differentiation and Integration
Differentiation of few standard functions: Polynomial, Rational, Exponential, Logarithmic and Trigonometric functions, Product rule, Quotient rule, Successive Differentiation. Integration of standard functions, Method of change of variables and Method of substitution for Integrals, Definite Integrals and their properties; Practical applications of integrals such as area of curves and line integrals.

Module III: Differential equations
Order and Degree of ODE, General solution and Particular solution, formation of ODEs, Differential equations of first order, Variable separable method, Homogeneous method and its variants, Differential equations of second order with constant coefficients, Complementary function and Particular Integral for some standard functions.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text/References:

Tesxt:

- NCERT MATHEMATICS – PART I- II, Textbook for Class XII
- R.B. Babat, Linear algebra and linear model, Hindustan book agency
- Advanced Engineering Mathematics By Erwin Kreyszig.
- Ordinary Differential Equationbs By Tenebaum and Pollard

References :

- K. Hoffman and R. Kunze, Linear algebra, second edition, Prentice Hall India Learning Private Limited
- Elementary Differential Equations, William E.Boyee, Richard C.DiPrima (Ninth Edition)

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MATHEMATICS – II for BCA II

Course Code:

L-T-P : 2-1-0 **Credit Units : 03**

Course Objective: The objective of this course is to expose the students to the fundamentals and the concepts of Mathematics including application of derivatives, partial differentiations and vector calculus. This course is designed to understand the basic mathematical logic as a foundation of computer science and applications.

Module I: Application of Derivatives
Rolle's theorem, Mean value theorem: Langrange's form, Cauchy's form. Generalized Mean value theorem: Taylor's theorem, Indeterminate form: Taylor's infinite series, Maclaurian's series, Power Series expansion of some standard functions: e.g., sin x, cos x, log (1+x), etc., Maxima and minima of functions in one variable. Partial differentiation, Euler's theorem and its corollaries.

Module II: Vector calculus
Differentiation of vectors, scalar and vector point function. Gradient of a scalar field. directional derivative, divergence and curl of a vector field and their physical interpretations. integration of vectors, line integral, surface integral, volume integral and their applications and physical significance.

Module III: Partial Differential equations and its applications.
Formation of partial differential equations, Lagrange's linear partial differential equation. Classification of second order partial differential equations. Method of separation of variables and its application to solve wave equation, one dimensional heat equation, Laplace equation.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text/References:

Text:

- NCERT MATHEMATICS – PART I- II, Textbook for Class XII
- "Higher Engineering Mathematics '' by Grewal,B S

References :

- Essential Calculus with application by Richard A Silverman
- W. A. Strauss, Partial Differential Equations: An Introduction,Wiley2007 (2nd edition)
- Strauss, M. J., Bradley, G. L. and Smith, K. J. (2007): Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

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B.Tech (Civil Engineering) – 4th Semester

NUMERICAL METHODS and COMPUTER PROGRAMMING

Course Code:

L-T-P: 3-0-0 **Credit Units: 03**

Course Objective:

This course deals with the techniques of numerical analysis which provides conceptual understanding of various numerical methods, in particular, with reference to numerical solution of Non linear Equations and System of linear Equations, Interpolation, Numerical Differentiation and Integration and Numerical solution of Ordinary Differential Equations.

Course Contents:

Module I: Solution of Algebraic and Transcendental Equation

Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Secant method, Convergence of Newton-Raphson method. Comparison of these methods.

Solutions of Simultaneous equation: Direct method: Gauss elimination and Gauss Jordan method and Iterative methods: Jacobi's method, Gauss Seidal method and their comparison.

Module II: Interpolation

Finite difference operators, Difference table for Polynomial Interpolation: Newton's forward and backward formula, Stirling's and Bessel's formulae.

Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula.

Module III: Numerical Integration and Differentiation

Introduction, Numerical differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules and their analysis.

Module IV: Solution of Differential Equations

Picard's Method, Euler's Method and its variants, Taylor's Series method, Runge-Kutta 2nd and 4th order Method and their error analysis.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

- M.K. Jain, S.R.K.I. Yengar, R.K. Jain, Numerical methods for scientific and Engineering computations, New Age International (P), Ltd., 1999.
- K Atkinson, Elementary Numerical Analysis, Wiley 1985.
- E. Scheid, Numerical Analysis, Mc Graw Hill 1988.
- Numerical Methods B.S. Grewal Khanna Publications
- C.E. Froberg, Introduction to Numerical Analysis, Addison –Wesley 1981.
- Philips, G. M.,Taylor,P. J. ; Theory and Applications of Numerical Analysis (2nd Ed.),Academic Press, 1996.

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B.Tech (Civil Engineering) – 4th Semester

NUMERICAL METHODS and COMPUTER PROGRAMMING lAB

Course Code:

L-T-P: 0-0-2 **Credit Units: 01**

Course Objective:

This course deals with the practical techniques/experiments for numerical analysis which provides conceptual understanding of various numerical methods, in particular, with reference to numerical solution of Non linear Equations and System of linear Equations, Interpolation, Numerical Differentiation and Integration and Numerical solution of Ordinary Differential Equations.

Course Contents/Programs:

LAB SESSION (ANY TEN PROGRAMM TO BE DEVELOPED) WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C/C++

1. To find the roots of non-linear equation using Bisection method.
2. To find the roots of non-linear equation using Newton's method.
3. To find the roots of non-linear equation using Iteration method.
4. To solve the system of linear equations using Gauss- Elimination method.
5. To solve the system of linear equations using Gauss-Seidal iteration method.
6. To solve the system of linear equations using Gauss-Jorden method.
7. To Integrate numerically using Trapezoidal rule.
8. To Integrate numerically using Simpson's rules.
9. To Integrate numerically using Euler's rules.
10. To find numerical solution of ordinary differential equations by any one methods Euler's/ Runge - Kutta method.

NOTE: Ten experiments are to be performed, out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & setup by the concerned department as per the scope of the syllabus.

Or

LAB SESSION (ANY TEN PROGRAMM TO BE DEVELOPED) WRITE DOWN AND EXECUTE THE FOLLOWING PROGRAMS USING C/C++

 # We will perform the numerical analysis/methods using programming C/C++/MATLAB.

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B.Tech (CSE/IT) – 4th Sem

DISCRETE MATHEMATICS

Course Code: CSE2403 **Credit Units: 04**

Course Objective:

Discrete structure is the study of logical and algebraic relationships between discrete objects. At the end of the course, students will be able to relate computing theory with applications, understand the fundamentals of Discrete Mathematics including Set Theory, Mathematical Logic, Relation, Functions and Lattices.

Course Contents:

Module I: Sets, Relation and Functions:

Sets and Subsets, Operations on Sets, Set Identities, Matrices, Mathematical Structures, Principle of Inclusion and Exclusion. Product Sets and Partitions, Relations and Digraphs, Properties of Relation, Equivalence Relation, Functions: Properties of Function, Composition of Function, Inverse, Binary and n-ary operations.

Module II: Logic

Proposition, Propositional Calculus- Propositional Variables and Compound Propositions, Basic Logical Operations: -Conjunction, Disjunction, Negation, Conditional, Bi-conditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency.

Module III: Counting

Pigeonhole principle, Mathematical Induction, Recurrence Relation: Solving Linear Homogeneous Recurrence Relations with Constant Coefficients, Solving Recurrence Relations using Generating Functions.

Module IV: Lattices

Lattices: Lattices as partially ordered sets, their properties, duality, Lattices as algebraic systems, Sub lattices, Direct products, Bounded Lattices, Complete Lattices, Complemented Lattices and Distributive lattices.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

Text:

J.P. Tremblay & R. Mamohan, "Discrete Mathematical Structure with Application to Computer Science," TMH, New Delhi (2000).

Kolman, Busby & Ross "Discrete Mathematical Structures", PHI.

Iyengar, Chandrasekaran and Venkatesh, "Discrete Mathematics", Vikas Publication.

Peter Linz, "An Introduction to Formal Languages and Automata", Narosa Publishing House.

References:

J. Truss, "Discrete Mathematics", Addison Wesley.

C.L. Liu, "Elements of Discrete Mathematics", McGraw Hill Book Company.

M. Lipson & Lipshutz, "Discrete Mathematics", Schaum's Outline series.

J. E. Hopcroft & J. D. Ullman, "Introduction to Automata Theory, Languages and Computation", Addison Weliy.

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BIOINFORMATICS AND BIOSTATISTICS

Course Code: BCH 4102 **Credit Units: 04**

Course Objective: An important objective of the course is to develop an understanding of the basics of biostatistics and bioinformatics. The course will familiarize students with the application of biostatics and bioinformatics in biochemical research.

Module I: BiostatisticsI

Principles and practice of statistical methods in biological research, samples and populations, measures of central tendency; mean ,median mode; standard deviations and standard error, measures of dispersion: correlation and regression, sampling theory, Coefficient of variation

ModuleII: BiostatisticsII

Estimation and test of significance, Q Test, F Test and T Test, Pearsonian chi square Basic idea of probability, probability distributions, binomial, Poisson, normal Statistical quality control

Module III: Bioinformatics

Concept of database, Protein Data Bank, Gene Data Bank. Expassy, Uniprot Use of computer program to analyze DNA sequences to find complementary sequences, search repeats, restriction sites, coding sequences, codon usage, etc BLAST, FASTA, MULTALIGN, CLUSTAL W initial concept of phylogeny, phylip

Examination Scheme:

Components	CT	HA	S/V/Q	ATTD	EE
Weightage(%)	15	5	5	5	70

References/Texts

1. Fundamentals of Biostatistics by Bernard Rosner.
2. Textbook of Biostatistics I by A.K. Sharma.
3. Bioinformatics: Sequence and genome analysis by David W. Mount.
4. DNA Sequencing: From Experimental Methods to Bioinformatics

Author(s): Luke Alphey.

5. Introduction to Bioinformatics, Author(s): Teresa Attwood, David Parry-Smith.

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APPLIED MATHEMATICS-I for BSc I Forensic Science

Course Code: FCH2105 **CreditUnits: 02**

Course Objective:

The objective of this course is to provide an introduction to the fundamentals and concepts of basic mathematics vectors and matrices, differentiation, and integration.This course aims to assist the students to develop confidence in handling mathematical concepts and techniques and to understand the principles and Concept of differential Calculus and integral calculus.

Course Contents:

Module I: Matrices and Determinants

Definition of Matrix, Sub matrix, types of Matrices such as Symmetric and Asymmetric, Square, Diagonal Matrices, Singular and Nonsingular matrices, Addition, Subtraction, Multiplication of Matrices, Determinant of Square Matrix, Rank of a matrix -Consistency of equations - Eigen roots and Eigen vectors - Cayley-Hamilton theorem (without proof)-Verification and computation of inverse matrix.

Module II: Differentiation

Differentiation of few standard functions: Polynomial, Rational, Exponential, Logarithmic and Trigonometric functions, Product rule, Quotient rule, Successive Differentiation, Maclaurin Series.

Module III: Integration

Integration of standard functions, Method of change of variables and Method of substitution for Integrals, Integration by parts, Definite Integrals and their properties. Practical applications of integrals such as line integrals and area of curves.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References:

- NCERT MATHEMATICS – PART I- II, Textbook for Class XII
- R.B. Babat, Linear algebra and linear model, Hindustan book agency
- Advanced Engineering Mathematics By Erwin Kreyszig
- K. Hoffman and R. Kunze, Linear algebra, second edition, Prentice Hall India Learning Private Limited
- P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I &II.Muhil Publishers, Chennai.
- P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand& company Ltd.

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BCA/BCA+MCA /BSC(IT) - 5TH SEM
COMPUTER ORIENTED NUMERICAL METHODS

Course Code:

L-T-P : 3-0-0 **Credit Units : 03**

Course Objective:

This course deals with the techniques of numerical analysis which provides conceptual understanding of various numerical methods, in particular, with reference to numerical solution of Non linear Equations and System of linear Equations, Interpolation, Numerical Differentiation and Integration and Numerical solution of Ordinary Differential Equations.

Course Contents:

Module I: Solution of Algebraic and Transcendental Equation

Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Secant method, Convergence of Newton Raphson method.

Solutions of Simultaneous equation: Direct method: Gauss elimination and Gauss Jordan method and Iterative methods: Jacobi's method, Gauss Seidal method.

Module II: Interpolation

Finite Differences, Difference table for Polynomial Interpolation: Newton's forward and backward formula, Stirling's and Bessel's formulae.

Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula.

Module III: Numerical Integration and Differentiation

Introduction, Numerical differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules and their analysis.

Module IV: Solution of Differential Equations

Picard's Method, Euler's Method and its variants, Taylor's Series method, Runge-Kutta 2nd and 4th order Method and their error analysis.

Examination Scheme:

Components	CT1	A/C/Q	Attd	EE
Weightage (%)	15	10	5	70

Text & References:

- M.K. Jain, S.R.K.I. Yengar, R.K. Jain, Numerical methods for scientific and Engineering computations, New Age International (P), Ltd., 1999.
- K Atkinson, Elementary Numerical Analysis, Wiley 1985.
- E. Scheid, Numerical Analysis, Mc Graw Hill 1988.
- Numerical Methods B.S. Grewal Khanna Publications
- C.E. Froberg, Introduction to Numerical Analysis, Addison –Wesley 1981.
- Philips, G. M.,Taylor,P. J. ; Theory and Applications of Numerical Analysis (2nd Ed.),Academic Press, 1996.
- Gourdin,A. and M Boumhrat;Applied Numerical Methods.Prentice Hall India, New Delhi,(2000).

R. K. Sharma. 5/2/18 5/2/18

Modified

Engineering Mathematics I

Subject Code: **Credits: 4**

Course Objective: The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. The main aim of the course is to develop basic understanding of the fundamental concepts of some essential topics relevant to various streams of engineering.

Course Contents:

Module I: Successive Differentiation, Leibnitz theorem (without proof), Problems based on Leibnitz's theorem, Maclaurin's series in one variable, Taylors expansion in one variable, Asymptote & Curvature, Point of inflection, Double Points, Cusp, Node and conjugate points, Curve tracing for Cartesian and polar curves.

Module II: Partial differentiation and problems, Euler's theorem and its proof, Problems based on Euler's theorem, Few corollaries on Euler's theorem for higher order derivatives and problems based on them, Taylors expansion of a function in two variables, Jacobians, its properties, and transformations of coordinates, Maxima and minima of a function in two variables, Method of Lagrange's multipliers and problems.

Module III: Double and triple integrals, Change of order of integration, Change of variables, Application of integration to lengths, Surface, areas and Volumes Cartesian and Polar coordinates. Beta and Gamma functions.

Module IV: General introduction and overview of differential equations, Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order and first degree, Orthogonal trajectories, electric circuits, Newton's law of Cooling; Linear differential equation of higher order with constant coefficients: Complementary function and particular integral for some standard functions. Method of variation of parameters, simultaneous linear equations with constant coefficients, Applications of linear differential equations to simple pendulum, electric circuits

Examination/Evaluation Scheme Components:

Assignments/Quizzes (10%); Sessional Test (15%); End Semester Exam (70%); Attendance (5%)

Suggested Texts and References

1. E. Kreyszig, Advanced Engineering Mathematics, 10th Edition, John-Wiley & Sons, 2011.
2. B. V. Ramana, HIGHER ENGINEERING MATHEMATICS; Publisher: TATA MCGRAW HILL; New Delhi; Year:2007
3. R.K.Jain & S.R.K. Iyenger, Advanced Engineering Mathematics, Narosa Publishing House, 2017.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd edition (2014) .
5. Peter V. O Neil, Advanced Engineering Mathematics, CENGAGE Learning Custom Publishing; 7th ed.,2011.
6. Thomas & Finley, Calculus, Narosa Publishing House, 1996.
7. Differential Calculus by Shanti Narayan, S Chand Publications.
8. Integral Calculus by Shanti Narayan, Mittal P.K., S Chand Publications; 35th Revised edition, 2005.

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R. K. Sharma.

Modified

Engineering Mathematics II

Subject Code: **Credits: 4**

Course Objective: *The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. The main aim of the course is to develop basic understanding of the fundamental concepts of some essential topics relevant to various streams of engineering.*

Course Contents:

Module I Fourier Series of period 2π, Change of interval, Even and odd functions, Half range sine and cosine series; Laplace transform of some standard functions, Properties of Laplace transform, Inverse Laplace transforms, Properties of Inverse Laplace transforms, using partial fractions for inverse Laplace transforms, Convolution theorem (without proof), Application of Laplace transforms to solve various types of differential equation, e.g., differential equations with constant coefficient, variable coefficients, simultaneous differential equations.

Module II Formation of Partial Differential Equations, Classification of Partial Differential Equations, Solution of first order linear partial differential equations of the form $P\,p + Qq = R$, Linear PDE with constant coefficients of 2nd order and their classification.
Method of separation of variables, Solution of wave equation in one and two dimensions, Solution of heat (in one and two dimensions) and Laplace equation using method of separation of variables.

Module III Scalar and Vector fields, Vector differentiation, Directional derivatives Gradient, Divergence and curl and their physical significance. Evaluation of Line integral, Greens theorem in plane (without proof), Stokes theorem (without proof), Gauss Divergence theorem (without proof) and problems based on them.

Examination/Evaluation Scheme Components:
Assignments/Quizzes (10%); Sessional Test (15%); End Semester Exam (70%); Attendance (5%)

Text & References

1. Kreyzig, E., "Advanced Engineering Mathematics", John Wiley & Sons.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd edition (2014).
3. Jain, M.K. and Iyenger, S.R.K., "Advanced Engineering Mathematics", Narosa Publications.
4. Thomas, B.G., and Finny R.L., "Calculus and Analytical Geometry", Pearson education Asia, Adison Wesley.
5. Simmons G.F., "Differential Equations with Applications", Tata McGraw Hill

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5/2/18

RESEARCH METHODOLOGY & STATISTICS

Course Code: FCH2204 **Credit Units: 02**

Course Objective: This course objective is to introduce the student with the:

1. The research process: conceiving, designing, conducting and analyzing.
2. Methods of statistical description and analysis
3. Ethical issues about research
4. Graphical presentation of data

Course Contents:
Module I: Introduction Definition, concept and research in science and forensic science.
Module II: Methods of Research Introduction to Research Methodology; scientific and social science and behavior science method. Experimental research and non – experimental research design. Observation, questionnaires, interview, schedules, case study methods, types of data, graphical representation of data
Module III: Introduction to Statistics Introduction to statistics; one tailed test, two tailed test, parametric (f-test, z-test, t- test, chi square test) and non-parametric statistics (sign test, rank test).
Module IV: Descriptive Statistics Measures of central tendency (Mean, Mode, Median); Measures of dispersion (Range, Variance, Skewness Kurtosis, Quartile); simple correlation methods (Karl Pearson method and regression on two lines).

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

1. Broota, K.D., Experimental designs in psychological research, Wiley eastern, New York, 1992.
2. Guilford, Statistics in Psychology and Education, McGraw hill, New York, 1986.
3. Katz and Kahn, Research in Behavioural Sciences, Methuen, USA, 1979.
4. Kerlinger, F., Foundations of Behavioural Research, Surjeet Publications, Delhi, 1983.
5. Rajamanickam, M., Statistical Methods in Psychological and Educationa! Research, Concept Publishing Co. New Delhi, India, 1983.
6. Smith, Jonathan, A. (Ed.), Qualitative Psychology: A Practical Guide to Research Methods, Sage Publications, 2003.
7. Woodworth and Schlosberg, Experimental Psychology, Methuen and co. ltd, London, 1971.

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Amity University Haryana, Gurgaon

Amity School of Applied Sciences (ASAS)

Guidelines for preparing MSc Final Semester Project Report

1 General Introduction

In accordance with the General Academic Regulations of Amity University Haryana, Gurgaon, the **F**inal **S**emester **P**roject (FSP) is an integral and compulsory part of the MSc program in Amity School of Applied Sciences (ASAS). All students will take a project module in his/her choice of discipline in the final semester of the program.

The main objective of FSP is to check if a student enrolled for MSc program has acquired sufficient capacity of critical thinking and applying techniques and methods related to his/her discipline. The project will consist of original research, investigation, compilation or experimentation, and making some noticeable contribution for discovering a new knowledge in his discipline.

1. FSP report is an orderly presentation of the results of an investigation, compilation or experiments related to the area of specializations and contributing to actual or identification of solution to a scientific problem.
2. FSP report is a 16 credits module (15 credits for MSc Applied Physics) and final project report must be written, and successfully evaluated before awarding degree.
3. FSP is considered as one module of the curriculum, its evaluation must take place within University Campus and the student himself should be available to defend his FSP report in person.
4. A student will be allowed for FSP report defense only after successfully completing all other activities planned in the academic curriculum.

2 General Provisions

Prior to obtaining his/her Master's degree, a student must submit FSP report. The report can be based on the outcomes of the research activities carried out in a laboratory or in another teaching/research unit of Amity University Haryana, Gurgaon. With the agreement of the faculty and depending on the research topic, research activities can also be done from other institution with a prior approval from HOD and HOI.

The FSP project will be assessed on the submission of hard copy of FSP report, as well as presentation and the Viva-voce. Students are required to make oral defense of their FSP using Power Point presentation. Students should comply with the deadlines set by the department; failing which a penalty decided by the respective department may be imposed.

3 Selection, Approval of the topic for FSP

1. The department should help students to choose supervisor by providing them a list of available qualified staff and their area of specializations. A student will choose his supervisor who will help him to make the FSP proposal.
2. The topics for FSP may be proposed by the faculty members. The students can also approach to the faculty members with their own topics of interest.
3. A student can wisely choose electives in IIIrd and IVth semester which may be helpful for selecting a topic for FSP.
4. Following points may be helpful for a student to identify a problem for his FSP:
   (a) What is the motivation to do a final year project?

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(b) How a student remain interested in his/her research topic?

(c) A student must clearly identify his/her strengths and weakness while choosing a topic for research.

(d) Students must understand 5 Ws. What? Why? Who? Where? When? regarding his research topic. These Ws are explained below:

- **What?** Student must understand what his/her research topic is? He should be able to clearly define what is his research topic, what are the aims of the study and what are the expected outcomes of the study?
- **Why?** Student has to understand why to choose a particular topic as a research topic. What is the significance, relevance and practical applications of the selected research topic? A extensive literature survey should be conducted before start working on the selected research topic.
- **Who?** Student must think about the persons/experts/faculty members who shall be involved in his study.
- **Where?** Student should identify facilities which may be required to carry out his research. In case in-house facilities are not sufficient for his work, he should look for places/institutions where these facilities are available. He should plan to take required permissions well in advance from the competent authorities from both his parental school here in the university and the host institution. He/should also plan for budgets required to conduct his study.
- **When?** Student should prepare a time-line to successfully complete his research in time. How much time is required for literature survey, collecting data or solving a problem, analyzing results, writing his report. Student should plan for his research work referring to the university academic calender and/or deadlines set the department/school.

5. All students enrolled in the last year of Master's degree must register officially their FSP proposals, no later than one month after the opening of IVth semester. A research proposal is a starting point of any research activity and generally, it must contain the following:

   (a) **Problem Statement** It is a brief description of the problem which may include background of the problem, a mathematical representation of the problem, description about the notation used. Student can further describe the significance and relevance of the problem in this section. Clearly mention, in case any assumptions or simplifications are considered in order to carry out the study.

   (b) **Aims and Objectives** Clearly mention the aims and the objectives of the study. Briefly describe, literature survey: what other people have done in this area, their main results followed by the novelty of your study.

   (c) **Scope of the study and main results** The scope of the study should be mentioned here. Specify the limits also if they exist. Main results of the study followed by a future extension of the work may also be proposed here.

   (d) **Time-line chart** It is basically a list of activities and expected duration to finish them.

6. The proposal must be signed by the student and the supervisor prior to the submission to their respective departments. The topic for FSP becomes official when approved by the Department or the committee appointed by HOI. After approval of all FSP proposals, the department has to submit a report to the HOI's office.

7. At the same time the choice of the supervisor also becomes official. Any change in the topic (that does not involve a change of supervisor) must be notified to the HOI through HOD by the supervisor, well in advance. However, all possible changes in the topic can be done only in the Ist month of IVth semester.

4 The role of a supervisor

1. The supervisor or co-supervisor should be a faculty member approved by the department. He/She can a be a faculty member of the university or someone from outside the university.

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2. It is desirable that a student is placed with a single supervisor, so that each student remains the responsibility of one person. However, in a case where there is a real sharing of responsibilities, particularly when the project involves interdisciplinary research study, co-supervision may be allowed. The approval of the choice of an outside expert as co-supervisor would be base on the fact that he/she is available and has particular skills which are complementary to those of the supervisor.

3. The supervisor (or co-supervisor) has to make sure that research activities required for a successful submission of a project are carried out in a systematic way. The outcome of the project work should be clearly outlined. Student's personal contribution to the research work shall be the deciding factor for evaluating the report. The work done by others or available in literature must be properly cited in the report.

4. The change of the supervisor must be exceptionally based on relevant grounds with adequate justification. The Department shall inform such case to HOI, and it is his prerogative to approve or disapprove change of supervisor.

5. In general, a FSP will be done by one student under the supervision of one supervisor. However, in case of a large topic, or it is not possible to assign one supervisor to one student, a FSP can be done by a group composed of not more than 3 students. In this case the work should be clearly defined for each student of the group working under one supervisor.

6. All the students working for their FSP are required to submit **M**onthly **P**rogress **R**eport (MPR) on the last week of every month to their respective supervisor(s). All MPRs should be signed by both student and his supervisor. These MPRs should also be shared with HOD or by the person nominated by HOD. These MPRs shall finally be put as an appendix in FSP report.

7. All faculty members are supposed to keep a track of the progress towards successful completion of FSP report of their respective students. If required, they may also maintain an attendance register for their students. If a student doesn't report to his supervisor for continuously for **four weeks**, the same may be reported to the HOD/HOI for necessary corrective action.

8. The supervisor must ensure that FSP report, including PPT presentation for viva-voce, is thoroughly checked in terms of the quality of the content and documentation, and his/her students successfully submit the FSP report. No excuse shall be entertained by the department/school if a student fails to submit his FSP report within the time limits set by the school.

5 Preparing Final Semester Project Report

The FSP report must follow:

- be written in English, apart from quotations and recognized technical formulae
- be thoroughly checked to ensure clear, formal English has been used throughout and that there are minimal typing errors and/or spelling mistakes
- should be written by selecting an easily readable font, such as Times New Roman or Arial
- font size 12pt is preferred, but a minimum font size 11pt is recommended for text and 10pt for footnotes
- use one-and-a-half spaced type
- portrait would usually be expected, landscape may be permitted for putting figures and tables
- use single sided or double-sided printing
- allow a margin of 3 to 3.5cms on the left-hand edge of each page (or on the inner edge, whether left hand or right hand side, in the case of a thesis which is printed on both sides of the paper).

Generally, a report must contain following parts:

Cover page: The cover page should include following indications:

1. Amity University Haryana, Gurgaon with logo

2. Name of the School
3. Name of the Department
4. Title of the Project (All in capital letters and at the center of the cover page)
5. A Final Year Project in partial fulfillment of the academic requirements for the award of Master's degree in .....
6. By: Student Name (in capital letters)
7. Supervisor: Name of the Supervisor
8. Co-Supervisor: Name of the Co-Supervisor (if any)'
9. Summation date in dd mm yy (Date, Month, Year) format.

Declaration: On the next page, student has to declare following in a specified format:

> I, (name of the student), declare that this Final Year Project Report is my own work. To the best of my knowledge it contains no material which has been previously published or submitted, to a substantial extent, has been accepted for the award of any degree or diploma at Amity University Haryana, Gurgaon or any other educational institution. Any contribution made to the research by the others is duly cited and explicitly acknowledged in the report.
>
> The declaration is to be signed by the student with a mention of place and date.

Dedication: Dedication can be mentioned on a separate no more than one page.

Acknowledgments: The people who have contributed in any one way or other for a successful completion of your project, their names can be acknowledged here.

Table of contents: Titles of all the chapters including their contents in the report should be properly indicated in the table of contents with their corresponding page numbers.

Notation, acronyms, and abbreviations: All the notations, acronyms and abbreviations used throughout the report must be explained here.

List of Tables: The tables prepared/used in the report should be numbered in order of their appearance in the text. The title of a table together with corresponding page number on which it exists should clearly be mentioned. In the text of the report, Table numbers and their titles should be clearly written and they should match with the specifications of a table given in the list of tables page.

List of Figures: Figures existing in the report should follow the same standards as the tables.

Abstract: Each project report must include a one page abstract. An abstract in a report may be considered as an invitation for the reader to read the report thoroughly. Analogously, it may also be considered as a 3-4 minutes trailer of a full length movie. It may include a brief introduction to the problem, the aim and objective of the study, the research methodology, the main results and conclusion of the study.

Introduction: It comprises the introduction and the background of the problem, formulation of the problem, aim and objectives of the study and main results. In general, it is same as the research proposal submitted earlier with more elaboration.

Literature Review: Summarize the important concepts and work available in the literature related to the study undertaken for FSP. The references used must be properly cited in the text and in the bibliography.

Research Methodology: Explain the research methods and techniques used to address the problem for FSP.

Results and Discussions Discuss the main results of the study undertaken and provide a scientific interpretation of the results obtained by using graphs or by other means of data interpretation.

Conclusions and Future work: Here, the author draws conclusions in which he compares his results with those of other similar works available in the literature. He specifies whether the aim which was proposed in the research proposal has been met, indicating that the proposed hypotheses is confirmed. Furthermore, he can suggest future extension of his work.

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Appendices: If they exit, appendices should be numbered in Arabic numerals.

References: This is a list of reference material which has been used in FSP report. Use the following convention for arranging references of various types:

1. Smith, T.F., Waterman, M.S.: Identification of Common Molecular Subsequences. J. Mol. Biol. 147, 195–197 (1981)
2. May, P., Ehrlich, H.C., Steinke, T.: ZIB Structure Prediction Pipeline: Composing a Complex Biological Workflow through Web Services. In: Nagel, W.E., Walter, W.V., Lehner, W. (eds.) Euro-Par 2006. LNCS, vol. 4128, pp. 1148–1158. Springer, Heidelberg (2006)
3. Czajkowski, K., Fitzgerald, S., Foster, I., Kesselman, C.: Grid Information Services for Distributed Resource Sharing. In: 10th IEEE International Symposium on High Performance Distributed Computing, pp. 181–184. IEEE Press, New York (2001)
4. National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov

6 Evaluation of FSP report

1. The schedule for completion of the FSP report and intermediate deadlines such as deadline for submitting first draft etc. are determined by the school. All the departments in the school shall comply with these deadlines.
2. Only in exceptional cases where a student fails to meet deadline due to his supervisor or the department, or other unforeseen reasons, an additional time period may be allowed accordingly. Such cases should be reported to HOD/HOI well in advance by the supervisor.
3. The final date of submission of the project report shall be decided by the school. The student will submit three copies (in spiral binding) of his project report by handing it over to the HOD office. The student has to fill a submission form which must be signed by the supervisor on or before the due date of submission. When deadline cannot be respected, the school or committee designated may allow an additional period not exceeding two months on a written request by the student and approved by his supervisor. Beyond this period, student shall have a new registration with special permission granted by competent authorities.
4. Within a week's time from the receipt of official FSP report submission authorization by the department, the HOD will send the proposal suggesting the appointment of members of the panel for evaluating project reports. The supervisor or co-supervisor and at least two to three faculty members of the department, an observer from outside the department (nominated by HOI) shall make a panel. Every FSP report must be properly defended by a student or a group of students for evaluation. HOD shall be the convener of these meetings.
5. The copies of FSP reports (a softcopy or hardbound form) should be made available to all the panel members well in advance, ideally few hours before the defense of FSP reports start.
6. Before the opening of the evaluation session, HOD provides the full list of FSPs, the evaluation form to all the members of the panel.
7. If for any reason, a member of the panel is expected to be absent, he/she must immediately notify this to HOD by mail so that he/she can be replaced by someone else. However, the supervisor of FSP can not be replaced.
8. The oral defense (Viva-Voce) will last for 20 minutes (15 minutes for student's oral defense and 5 minutes for questions and comments from panel).
9. Evaluation scheme may be as follows
   (a) Written Document (FSP report) 60%
      i. General introduction (problem statement, hypotheses, formulation, aims & objectives, relevance of the study) 20%
      ii. Literature survey 10%

iii. Research methodology 10%

iv. Result and discussions 10%

v. Conclusions 10%

(b) The oral defense (Viva-Voce) 30%

i. The content and organization of the slides 10%

ii. The presentation skills 10%

iii. Answering and defending queries raised by the panel 10%

(c) Monthly Progress Report (MPR) 10%

i. MPRs will be checked for following time-lines for the study.

10. Exceptionally good or bad FSP reports (in terms of grades and marks) may be reviewed/scrutinized by HOD/HOI.

11. In case, serious irregularities are reported by the supervisor or the panel evaluating the report or any act of plagiarism is found in the report, the panel constituted by HOI, after hearing both the parties shall take the final decision. Action against both, the student and his supervisor may be initiated if serious irregularities such as act of plagiarism are found to be true. The student may not be awarded his degree and the supervisor may be restrained to take students for any future research activity.

12. The panel members award the final marks corresponding to the average marks, and final grading is done.

13. After corrections suggested by the panel, if any, a copy of FSP report (in hard bound form) shall be submitted to the Library by the student after getting an approval from his supervisor.

14. After all deliberations, the Convener prepares the minutes of the meeting which shall be signed by all the members present in the panel. These minutes of meeting shall be submitted to HOI office.

7 Expenses incurred for preparing FSP report & IPR

1. The student is responsible for all the expenses incurred during the FSP report.

2. FSP report remains the property of the University. The student and his/her supervisor can publish results, but any use of the results for the business can not be made without the written consent of the competent authority of the university.

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