



Annexure 'A' of Agenda Mem. No. AC/11/01
(Total Page A-11-01-18) 41-01/A-01
GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

Sector - 16C Dwarka, New Delhi - 110078

F.No. IPU/JR(C)/40th AC/2016/47

Dated: 05.03.2016

Subject- Proceedings of the 40th meeting of Academic Council.

Please find enclosed herewith the proceedings of the 40th meeting of Academic Council of Guru Gobind Singh Indraprastha University held on Tuesday, 1st March 2016 at 11.30 a.m. in the Conference Hall of the University, Administrative Block-'A' wing, Dwarka Campus, New Delhi-110078 for approval.

Observations, if any may kindly be communicated to the office of the undersigned within week, consequent to no observation(s), communicated, the proceedings will be assumed as deemed approved.

Jt. Registrar (Coordination)

coordination112@gmail.com

09868527302/011-25302135

Dated: 05.03.2016

F.No. IPU/JR(C)/40th AC /2016 /47

- 1) All Deans and Directors of Guru Gobind Singh Indraprastha University
- 2) Prof.P.K.Julka, Dept. of Clinical Oncology, AIIMS, New Delhi.
- 3) Prof.M.C.Sharma, School of Education, (IGNOU), New Delhi.
- 4) Prof.M.P.Gupta, Department of Management Studies, IIT, Delhi.
- 5) Prof.A.K.Maitra, Former Director, School of Planning & Architecture, Delhi.
- 6) Prof.Karmeshu, School of Computer & System Sciences, JNU, New Delhi.
- 7) Prof. Surender kumar, Deptt. of Chemical Technology, IIT Roorkee, Uttarakhand.
- 8) Prof.J.P.Khurana, Dept. of Plant Molecular Biology, Faculty of Interdisciplinary & Applied Sciences, University of Delhi, South Campus.
- 9) Prof. Lallan Prasad, Retired Head and Dean of Dept. of Business Economics, Faculty of Applied Social Sciences, University of Delhi, South Campus.
- 10) Shri Arvind Misra, Former Dean, Faculty of Law, Dr. B.R. Ambedkar University, Agra, Ex.Director /Head, Post Graduate Deptt. of Law Agra College, Agra Former OSD (Law) to H.E. the Governor of UP, Lucknow.
- 11) Shri Sandeep Gupta, CEO, Academy of Embedded Technology, Delhi.
- 12) Prof. J.K. Garg, Professor, University School of Environment Management
- 13) Dr.Amar Pal Singh, Professor, University School of Law & Legal Studies.
- 14) Dr. Manpreet Kang, Associate Professor, University School of Humanities & Social Sciences
- 15) Dr. Meenu Kapoor, Associate Professor, University School of Biotechnology
- 16) Dr. Vaishali Singh, Associate Professor, University School of Basic and Applied Sciences

Copy for kind information of the Competent Authority:

- (i) AR to the Vice Chancellor GGSIP University
- (ii) SO to the Pro-Vice Chancellor GGSIP University
- (iii) AR to the Registrar GGSIP University

Jt. Registrar (Coordination)

coordination112@gmail.com

09868527302/011-25302135



GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY

FORTIETH MEETING

OF THE

ACADEMIC COUNCIL

DATE : 01st March, 2016 (Tuesday)

TIME : 11:30 a.m. onwards

VENUE : CONFERENCE ROOM

PROCEEDINGS

SECTOR -- 16C, DWARKA, NEW DELHI.

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AC40.02	Action Taken Report on the Proceedings of 39 th meeting of the Academic Council, held on 25 th June, 2015.	07
AC40.03	To ratify the decision to include additional information, for all programmes of studies governed by the revised the University Ordinances No. 10 and 11.	07
AC40.04	To ratify the notification of the guidelines to address the operational difficulties arisen due to revision of the University Ordinances No. 10, 11 and repealing of the University Ordinance No.27, for the student batches admitted up to the academic session 2014-2015.	07-08
AC40.05	To ratify the decision regarding the specification of degrees as per the University Grants Commission (UGC), Gazette Notification dated 05 th July, 2014 No.F.5-1/2013 (CPP-II).	08
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41.01/A-05

AGENDA No.	AGENDA ITEM(S)	Page No.
AC40.21	To consider and approve the implementation of the minor modification(s) in the existing scheme and syllabus of Master of Technology (M.Tech.) in the following programmes approved by the Board of Studies of the University School of Information and Communication Technology (USICT), from the academic session 2015-2016:- <u>M.Tech.(Regular Programme):-</u> (i)Information Technology, (ii) Computer Science & Engineering,(iii) Information Security , (iv)Electronics & Communication Engineering, (v)Digital Communication, (vi)Signal Processing, (vii) RF & Microwave Engineering and (viii)VLSI Design <u>M.Tech.(Weekend Programme):-</u> (i) Computer Science & Engineering (ii) Information Technology (iii) Electronics & Communication Engineering	15-16
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AC40.24	To ratify the extension of last date of submitting eligibility proof by November 2, 2015 for result awaited students of Engineering, B. Arch. & Professional Programmes (Except MBBS / BDS / PGMC / SSMC), admitted during Academic Session 2015-2016.	17



The course curriculum and scheme of examinations for the above programmes have been revised as per the UGC guidelines, merging some old papers and including important aspects like wetland. The revised scheme and syllabus has been implemented with the approval of Competent Authority from Academic Session 2015-2016. The Academic Council after consideration ratified the revised course curriculum and scheme of examinations for the above programmes offered by University School of Environment Management as implemented from academic session 2015-2016.

Annexed as Annexure 'N' of Agenda Item No. AC40.16 (Page N-01 to N-4)

Agenda Item No. AC40.17: To ratify the implementation of revised scheme and syllabus of Ph.D. course work of University School of Education (USE), from the academic session 2015-2016.

In pursuance of the provision of regulations of the University Ordinance 12 for programmes leading to the degree of Doctor of Philosophy (Ph.D.), the University School of Education on the recommendation of sub-committee of the Academic Council (15th December 2015) has updated and revised scheme and syllabus for Ph.D. coursework. The revised scheme and syllabus has been implemented with the approval of Competent Authority from Academic Session 2015-2016. The Academic Council after consideration ratified the revised scheme and syllabus for Ph.D. coursework implemented from Academic Session 2015-2016.

Annexed as Annexure 'O' of Agenda Item No. AC40.17 (Page N-01 to N-10)

Agenda Item No. AC40.18: To ratify the implementation of revised course curriculum and scheme of examinations for Ph.D. courses in the discipline of (i) Physics (ii) Chemistry (iii) Mathematics offered by the University School of Basic & Applied Sciences (USBAS) from the academic session 2015-2016.

In pursuance of the provision of Regulations of the University Ordinance 12 for programmes leading to the degree of Doctor of Philosophy (Ph.D.), the University School of Basic & Applied Sciences has revised the course curriculum and scheme of examinations for Ph.D. courses as approved by the sub-committee of Academic Council (17th September, 2015) in the following disciplines:

- (i) Physics
- (ii) Chemistry
- (iii) Mathematics

The revised curriculum and scheme of examinations for Ph.D. programme has been implemented with the approval of Competent Authority from academic session 2015-2016.

The Academic Council after consideration ratified revised course curriculum and scheme of examinations for the above programmes as implemented from Academic Session 2015-2016.

Annexed as Annexure 'P' of Agenda Item No. AC 40.18 (Page - P-01 to P-33).

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University School of Basic & Applied Sciences Guru Gobind Singh Indraprastha University



Scheme&Syllabus for Ph. D.Directed Course Work in the Discipline of Mathematics

2015 – onwards

Entrepreneurship | Employability | Skill Development

Approved in the 40th meeting of the Academic Council held on 01-03-2016 vide agenda item 40.18 w.e.f. 2015

Scheme of Ph. D. Directed Course Works in Mathematics

S. No.	Code	Paper	L	P	Credits
1.	PES 101	Research Methodology for Science & Technology	3	0	3
Elective (Choose atleast One)					
2.	CWM 102	Space Dynamics	3	0	3
3.	CWM 103	Wavelet Analysis	3	0	3
4.	CWM 104	Mathematical Modeling& Ecology	3	0	3
5.	CWM 105	Stochastic Processes, Queuing Theory & Reliability	3	0	3
6.	CWM 106	An Introduction to Fuzzy Mathematical Programming	3	0	3
7.	CWM 107	Nonlinear Dynamics	3	0	3
8.	CWM 108	Lie Groups and Homogeneous Spaces	3	0	3
9.	CWM 109	Differentiable Manifolds	3	0	3

Paper Name: Research Methodology for Science & Technology Credit: 3 Lectures: 40
Paper Code: PES 101

Unit – I

Definition, motivation & significance of research, types of research, research process and steps in conducting research; Planning research Problem identification and formulation; Research design; Application of Research scenario in India.

Unit – II

Review of the publisher research in the relevant field; Re-viewing literature; Report Preparation, Structure of Report, Report Writing Skills, Citations, Research Papers; formulation of research projects proposal; Types of reports, bibliography.

Unit – III

Values, standards & practices; scientific misconduct; human participants & animal subjects, authorship allocation of credit, competing interests, commitments & values. Definition, types of plagiarism, unintentional plagiarism, mechanisms for avoiding plagiarism.

Unit – IV

Understanding of invention & innovation and its role in economic development; patents & copyrights, importance & basic knowledge of Intellectual Property Right (IPR); what can and cannot be protected.

SUGGESTED REFERENCES

1. Research Methodology Methods and Techniques - C.R. Kothari, New Age Intl. Pub. (2004)
2. Business Statistics for contemporary decision making- Ken Black, John Wiley and Sons, Inc. 2010.
3. Research Methodology (Concept and Cases)-Deepak Chawla & Neena Sodhi, Vikas Publication House (P) Ltd. (2011)
4. Research Methodology- Debashis Chokarvaty, Surbhi (P) Ltd. (2010)
5. Research Methodology-Navin Sharma, Deep & Deep (P) Ltd. (2007)
6. Research Methodology -Ranjit Kumar, Delhi Pearson Education (2006)
7. “The Role of Invention, Innovation and The Industrial Property System in Economic Development”,
www.wipo.int/cdocs/mdocs/innovation/en/.../wipo_inn_cai_97_1.doc
8. MLA Handbook for Writers of Research Papes- Joseph Gibaldi, New Delhi, Affiliated East West Press (1999 15th edition).

Paper Name: Space Dynamics

Credit: 3

Lectures: 40

Paper Code: CWM – 102

Objective: To develop the Mathematical skill of using various mathematical methods.

Unit – I

10 h

Formulation of the twobody problem, Integrals of area, angular momentum and energy. Equation of the relative orbit and its solution. Kepler's equation and its solution.

Unit – II

10 h

Heliocentric and geocentric co-ordinates, Parabolic and hyperbolic orbits, Melnikov's integral, Orbit computation by Laplace and Gauss methods. Lagrange's solution for the motion of three bodies.

Unit – III

10 h

Restricted three body problem. Surface of zero relative velocity. Double points. Stability of straight line and equilateral triangle solutions. The ten integrals of motion of the n-body problem.

Unit – IV

11 h

Transfer of origin to one of the particles. The perturbing functions. Virial theorem. Numerical integration by Cowell's and Encke's methods

Recommended Books:

1. Theory of Orbits by V. Szebhely; Academic Press, 1967
2. Theory of Orbits by Boccaletti, Dina etc., Springer, 2004
3. Theory of Orbit Determination by Andrea Milani, Cambridge University Press, 2009
4. Theory of satellite orbits in an atmosphere by Desmond King – Hele, Butterworths edition, in English, 1987

Paper Name: Wavelet Analysis
Paper Code: CWM – 103

Credit: 3 Lectures: 40

Unit – I

11 h

Fourier and Inverse Fourier Transforms, Continuous-Time Convolution and the Delta Function, Fourier Transform of Square Integrable Functions. Fourier Series. Basic Convergence Theory and Poisson's Summation Formula.

Unit – II

11 h

The Gabor Transform. Basic Properties of Gabor Transforms. The Integral Wavelet Transforms, Dyadic Wavelets and Inversions.

Unit – III

11 h

Basic Properties of Wavelet Transforms. The Discrete Wavelet Transforms. Orthonormal Wavelets, Wavelet Frames & Multiband, Curvelets. Definition of Multiresolution Analysis and Examples.

Unit – IV

11 h

Properties Scaling Functions and Orthonormal Wavelet Bases. Construction of Orthonormal Wavelets. Daubechies' Wavelets and Algorithms.

Recommended Books:

1. The Fourier Transform & Its Applications by Ronald Bracewell. McGraw Hill, 2000
2. An Introduction to Wavelet by Charles Chui, Academic Press, 1992
3. Wavelets made easy by Yves Nievergelt, Springer-Verlag, 1999
4. Essential Wavelets for Statistical Applications & Data Analysis by Todd Ogden, BirkhauserBostan Inc., 1996

Paper Name: Mathematical Modeling & Ecology
Paper Code: CWM - 104

Credit: 3 Lectures: 40

Objective: To develop the Mathematical skill of using various mathematical methods.

Unit – I

11 h

Deterministic and stochastic models, tools, techniques, modeling approaches. Models of single and interacting populations, prey-predator, competition, chemical state, AIDS/HIV/SARS. Epidemic and genetic models. Model for dialysis, Model for brain tumor.

Unit – II

11 h

Single species models, Exponential, logistic, Gompertz growth, Harvest model, Discrete-time and Delay model, Interacting population model, Dynamics of exploited populations, Spatially structured models.

Unit – III

11 h

Models for traffic flow, computer data communication, Stock Market, spatio-temporal pattern. Model of Physical and Engineering systems-Heating and cooling systems, Henon-Heile's systems, Hydro power plant, fuel injection systems and ankle joint.

Unit – IV

11 h

Age-structured models, Leslie matrix, Randomly fluctuating Environment, prey-predator and multi-species models in stochastic environment.

Recommended Books:

1. Mathematical Modelling by J. N. Kapur, New Age International, 1998
2. Mathematical Biology by J. D. Murray, Springer, 2003
3. Elements of Mathematical Ecology by Mark Kot, Cambridge University Press, 2001
4. Mathematical Models and Methods for Real World systems by K. M. Frauti, A. H. Siddiqui, Taylor Francis Group (CRC), 2005

Paper Name: Stochastic Processes, Queuing Theory & Reliability Credit: 3 Lectures: 44
Paper Code: CWM - 105

Objective: To develop the Mathematical skill or using various mathematical methods.

Unit – I

11 h

Markov chains with finite and countable state space, classification of states, limiting behavior of n-step transition probabilities, stationary distribution, branching processes, Random walk, Gambler's ruin, Markov processes in continuous time, Poisson processes, birth and death processes, Wiener process.

Unit – II

11 h

General Concept, Generalized Queuing model, M/M/1, M/M/1/N and M/M/s Queue, Bulk Queue, Network of Monrovia Queueing System, Non Markovian Queueing Models, M/G/1, GI/M/1 Queue.

Unit – III

11 h

General concept of discrete time queues, Applications of Queuing theory. Introduction to Reliability Theory, System Reliability, Repairable and Non Repairable Systems.

Unit – IV

11 h

Morkov Modeling in Reliability, Life testing using the exponential and Weibull models, Shock Models and Wear Process, Concept of Redundancy.

Recommended Books:

1. Stochastic Processes by Sheldon M. Ross, Wiley India Pvt. Ltd., 1995
2. Essentials of Stochastic Processes by Rick Durrett, Springer, 1999
3. Mathematical Methods in Queuing Theory by Kalashnikov, Kluwer Academic Publisher, 2010
4. Reliability Theory and Practice by Igor Bazovsky, Dover Publication, 2004

Paper Name: An Introduction to Fuzzy Mathematical Programming

Credit: 3

Lectures: 40

Paper Code: CWM - 106

Unit – I

Duality in linear programming, two person zero-sum matrix games, linear programming and matrix game equivalence, two person non-zero sum (bi-matrix) games, quadratic programming and bi-matrix game, constrained matrix games.

Unit – II

Fuzzy sets: Introduction, basic definitions and set theoretic operations, α Cuts and their properties, Convex fuzzy sets, Zadeh's extension principle, fuzzy relations, triangular norms (t-norms) and triangular conorms (t-conorms)

Unit – III

Fuzzy numbers and fuzzy arithmetic: Introduction, interval arithmetic, fuzzy numbers and their representation, arithmetic of fuzzy numbers, special types of fuzzy numbers and their arithmetic, ranking of fuzzy numbers.

Unit – IV

Decision Making in fuzzy environment: Fuzzy decisions, Fuzzy linear programming, Fuzzy game Theory.

References:

1. Bector, C. R. and Chandra, S., Fuzzy Mathematical Programming and Fuzzy Matrix Games, Springer, 2005
2. Klir, G. J. and Yuan, B., Fuzzy Sets and Logic: Theory and Applications, Prentice Hall India, 2004
3. Zimmermann, H-J., Fuzzy Sets Theory and its Applications, 4th Edition, Springer, 2001
4. G. Owen, Game Theory, Academic Press, San Diego, 1995

Paper Name: Nonlinear Dynamics
Paper Code: CWM - 107

Credit: 3 Lectures: 40

Objective: To develop the Mathematical skill of using various mathematical methods.

Unit – I

11 h

Central manifold and Normal form, attractors, 1D map, Logistic map, Poincare' maps, circle map. Bifurcations- Saddle-node, Transcritical, Hopf-bifurcation, Global bifurcations, Poincare's surface of sections, Melnikov's method for homoclinic orbits. Strange attractors & fractals dimensions. Henon map and Rossler system, Box-counting, Hausdorff dimensions. Lyapunov exponent, Horseshoe map chaotic transitions, intermittency, crisis, quasiperiodicity, controlling & synchronization of chaos.

Unit – II

11 h

Fractals in nature, Mathematical fractals (the Koch curve and other), Mathematical chaos (the Lorenz attractor). The Cantor set, the Sierpinski triangle and carpet, Self-similar fractals, fractal dimension, modeling of biological growth, Box dimension. Random fractals: Fractal forgeries, Iteration initial value, orbit, fixed point (attracting, repelling, neither), k-cycle (attracting, repelling, neither), fixed points, Period doubling.

Unit – III

11 h

The Feigenbaum constant, similarity of the Feigenbaum diagram for different functions. Continuous dynamical systems and strange attractors, Discrete dynamical systems. Phase space. The motion of a pendulum.

Unit – IV

11 h

Mathematical modeling, Attractors of typical 2-dimensional systems. Nodes, saddles, focuses, limit cycles, Strange attractors, The Mandelbrot set, the Julia set, geometrical features of Julia and Mandelbrot sets.

Recommended Books:

1. Dynamical Systems by Jurgen Jost, Springer, 2005
2. Dynamical Systems Stability, Controllability & Chaotic Behaviour by Werner Krabs, Springer, 2010
3. Fractals & Chaos by B. B. Mandelbrot, Springer, 2004
4. Stability of Dynamical Systems Continuous, discontinuous & Discrete Systems by Anthony N. Michel, Birkhauser Boston, 2008

Paper Name: Lie Groups and Homogeneous Spaces
Paper Code: CWM - 108

Credit: 3 Lectures: 40

Prerequisites: A good comprehension of Linear Algebra, Calculus, Abstract Algebra and Differentiable Manifolds.

Objective: To give an introductory course on the theory of Lie groups and homogeneous spaces.

Evaluation Procedure: Students are expected to prove rigorous theorems and to construct concrete examples.

Unit – I

Lie groups, Example of Lie groups, Smooth manifolds: A review, tangent space of a Lie group- Lie algebras, One parameter subgroups, the Campbell-Baker-Hausdorff series, Lie theorems.

Unit – II

Representation theory: elementary concepts, Adjoint representation, Killing form, tori, Classification of compact and connected Lie groups, Complex semisimple Lie algebras.

Unit – III

Left invariant and bi-invariant metrics, Geometrical aspect of a compact Lie group, Homogeneous spaces, Coset manifolds, Reductive homogeneous spaces, Isotropy representation.

Unit – IV

G-invariant metrics, Riemannian connection, Curvature, Symmetric spaces, structure of symmetric space, Geometry of symmetric space, duality.

Text books / Reference books:

1. Lie Groups: An Introduction through Linear Groups, Wulf Rossmann, Oxford Graduate Texts in Mathematics, Oxford University Press Inc., New York.
2. Naive Lie Theory, John Stillwell, Springer, 2008.
3. Matrix Groups: An Introduction to Lie Group Theory, Andrew Baker, Springer, 2003.

4. Lie Groups, Lie Algebras, and Representations: An Elementary Introduction, Brian C. Hall, Springer, 2004.
5. Lie Groups: An Approach through Invariants and Representations, Claudio Procesi, Springer, 2006.
6. Lie Groups beyond an Introduction, Anthony W. Knap, Birkhauser, 2002.
7. Differential Geometry, Lie Groups, and Symmetric Spaces, Sigurdur Helgason, American Mathematical Society, 2001.

Paper Name: Differentiable Manifolds
Paper Code: CWM - 109

Credit: 3 Lectures: 40

Prerequisites: A good comprehension of Linear algebra, Calculus, Topology, Analysis and Differential Geometry.

Objectives: To give a introductory course on Differentiable manifolds.

Evaluation Procedures: Students are expected to prove rigorous theorems and to construct concrete examples.

Unit – I

Topological and differentiable manifold with examples, product manifolds, vector field and tangent space, Lie brackets, differential map and Jacobians, immersions and embeddings, differential forms and cotangent space, pull back map, geodesic and parallel transportation, covariant derivative and coefficients of affine connections.

Unit – II

Exterior derivative, Lie derivative, gradient, curl, divergence, Laplacian, Hessian on manifolds, interior product, orientations and volume element, integration in \mathbb{R}^n and its generalization to manifolds, Stokes' theorem

Unit – III

Levi-Civita connections, torsions and symmetry, Riemannian metrics and Riemannian connections, Riemannian curvature, sectional curvature, Ricci curvature, scalar curvature, connection forms, structural equations, curvature forms.

Unit – IV

First and second variation of arc length, Bonnet Theorem, exponential map, Jacobi vector fields and conjugate points.

Text Books / Reference books:

1. M. P. Do Carmo, Riemannian Geometry, Birkhauser Boston
2. M. P. Do Carmo, Differential Geometry of Curve and Surfaces, Birkhauser Boston
3. Nirmala Prakash, Differential Geometry, TMH publishing
4. Theodore Frankel, The Geometry of Physics, Cambridge University Press.