DEVI AHILYA VISHWAVIDYALAYA, INDORE

School of Data Science and Forecasting

1.1.2
Minutes of the Meetings and Changes in Syllabus

अधिसूचना

एतद्‌द्वारा अधिसूचित किया जाता है कि समन्वय समिति की 93 वीं बैठक दिनांक 25.10.2017 में कार्यपरिषद द्वारा अनुशंसित निम्नलिखित अध्यादेशों / परिनियमों को मान्य किया है, जिसे कार्यपरिषद की बैठक दिनांक 4.12.2017 को विषय कमांक 13 में अंगीकृत किया गया है :–

अध्यादेश / परिनियम कमांक	अध्यादेश / परिनियम
10(परिनियम)	परिनियम कमांक 10 के बिन्दु कमांक 08 में लाईफ लांग लर्निंग (प्रौढ शिक्षा) को शिक्षा संकाय के साथ जोड़ा जाना ।
परिनियम क. 10 एवं अध्यादेश03	अभियांत्रिकी विज्ञान संकाय के अन्तर्गत फ्यूचर स्टडी एवं प्लानिंग के स्थान पर डाटा विज्ञान करना ।
109	एम.टेक (एनर्जी एण्ड इन्वायरमेंट मैनेजमेंट)
233	एमबीए (एनर्जी मैनेजमेंट)
234	पी.जी.डिप्लोमा इन एनर्जी मैनेजमेंट
253	PG Diploma programs in Distance Education
254	बी.बी.ए.
255	एम.वोक.
246	बी.वोक.
55	M. Tech. (Future Studies and Planning) के स्थान पर M. Tech. (Data Science) किया जाना ।
6	परीक्षाएँ (सामान्य)
7	महाविद्यालयों / विश्वविद्यालय अध्यापन विभागों में छात्रों को प्रवेश,छात्रों का स्थानांतरण एवं अनुशासन प्रबंधन
18	पीएच.डी.
21	एम.फिल.
31	सी.बी.सी.एस. / ग्रेडिंग सिस्टम यू.जी.सी रेग्युलेशन,2016 के अनुसार संशोधन
378	M.Tech. (Systems Management) के स्थान पर M.Tech. (Big Data Analytics) किया जाना ।
201	B. A. (Journalism & Mass Communication)
256	डिप्लोमा इन लॉजिस्टिक एण्ड सप्लाय (कार्गो मैनेजमेंट)

2/ उक्त अध्यादेशों / परिनियमों की प्रति विश्वविद्यालय की वेबसाईट पर उपलब्ध की जा रही है ।

भवदीय,

कुलसचिव

SCHOOL OF FUTURE STUDIES AND PLANNING

MEETING OF THE DEPARTMENTAL COMMITTEE
MINUTES OF THE MEETING HELD ON 10/04/2014

The meeting of the departmental committee was held on 10/04/2014 at 3.00 p.m. in the Committee Room at the School. The following persons were present in the meeting:

Dr. V.B.Gupta	Head & Chairman
Mr. Vandit Hedau	Member
Mr. Avinash Navlani	Member

Modification of Existing M.Tech. Programmes:

The school has been offering M.Tech. programme in Future Studies and Planning since 1990. More than twenty years have been passed and still academia, society and industrial community do not have correct understanding of the programme and the students of M.Tech. in Future Studies and Planning face problems in getting appropriate job opportunities. Similarly job opportunities for the students of M.Tech. in Systems Management are also limited as systems word is very generic in nature.

To overcome these difficulties the committee recommends to redesign both M.Tech. programmes. The students strength in M.B.A. (Business Forecasting) is very less and not viable to run the programme. Therefore, it is recommended to discontinue M.B.A. (Business Forecasting) programme from next session i.e. 2014-15.

Seeing current industrial requirements it is recommended that M.Tech. programmes should be redesigned as follows for the new batch 2014-16:

1. M.Tech. (Future Studies and Planning) should be offered with specialization in Data Analytics. As per offered specialization in Data Analytics the following new courses should be introduced by replacing irrelevant old courses:

FIRST SEMESTER		SECOND SEMESTER	
Old Course	New Course	Old Course	New Course
Knowledge management	RDBMS and NoSQL	Innovation Management	Big Data Analytics
Econometrics	Statistical Programming in R	Market Research	Python for Analytics
-	-	Numerical Methods	Machine Learning

Syllabus for the new added courses was designed and approved.

2. M.Tech. (Systems Management): It is recommended that two courses should be replaced by the more relevant new courses. Software Engineering and MIS should be replaced by Operation Research and Big data Analytics respectively. Syllabus for the both new added courses was designed and approved.

(Mr. Vandit Hedau)   (Mr. Avinash Navlani)   (Dr. V.B.Gupta)

M.Tech. in Future Studies and Planning

Programme Structure   Batch: 2013-15

Note: The courses ==highlighted in yellow colour are dropped== and ==highlighted in green colour are introduced== for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS 711	Forecasting Methods	4 (2-1-2)
FS 712	Operations Research	4 (2-1-2)
FS 713	Statistical Research Methods	4 (2-1-2)
FS 714	Decision Analysis	4 (2-1-2)
ELECTIVE COURSES (Any Four)		
The students can choose any four courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (SM) programme.		
FS-715	Supply Chain Management	4 (3-1-0)
FS-716	Technology Management	4 (3-1-0)
FS-717	Knowledge Management	4 (3-1-0)
FS-718	Econometrics	4 (2-1-2)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-721	Technology Forecasting & Assessment	4 (3-1-0)
FS-722	Data Mining for Analytics	4 (2-1-2)
FS-723	Industrial Engineering and Systems	4 (3-1-0)
FS-724	System Dynamics	4 (2-1-2)
ELECTIVE COURSES (Any Three)		
The students can choose any three courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (SM) programme.		
FS-725	Innovation Management	4 (2-1-2)
FS-726	Market Research	4 (2-1-2)
FS-727	Numerical Methods	4 (2-1-2)
FS-728	Multivariate Analysis	4 (2-1-2)
Choice Based Course (Any One): The students can choose any one course from the courses being offered in this semester in other M.Tech. programmes being run in this campus.		

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	40

M.Tech. in Future Studies and Planning
Specialisation: Data Analytics

Revised Programme Structure   Batch: 2014-16

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-711	Forecasting Methods	4 (2-1-2)
FS-712	Operations Research	4 (2-1-2)

FS-713	Statistical Research Methods	4 (2-1-2)
FS-714	RDBMS and NOSQL	4 (2-1-2)
ELECTIVE COURSES (Any Four)		
The students can choose any four courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (SM) programme.		
FS-715	Supply Chain Management	4 (3-1-0)
FS-716	Technology Management	4 (3-1-0)
FS-717	Decision Analysis	4 (2-1-2)
FS-718	Statistical Programming in R	4 (2-1-2)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-721	Technology Forecasting	4 (3-1-0)
FS-722	Data Mining for Analytics	4 (2-1-2)
FS-723	Big Data Analytics	4 (2-1-2)
FS-724	Python for Analytics	4 (2-1-2)
ELECTIVE COURSES (Any Three)		
The students can choose any three courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (SM) programme.		
FS-725	Machine Learning	4 (3-1-0)
FS-726	Industrial Engineering and Systems	4 (3-1-0)
FS-727	System Dynamics	4 (2-1-2)
FS-728	Multivariate Analysis	4 (2-1-2)
Choice Based Course (Any One): The students can choose any one course from the courses being offered in this semester in other M.Tech. programmes being run in this campus.		

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	40

M.Tech. in Systems Management

Programme Structure   **Batch: 2013-15**

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-711	Introduction to Systems Engineering	4 (3-1-0)
SM-712	Software Engineering	4 (3-1-0)
SM-713	Database Management Systems	4 (2-1-2)
SM-714	System Analysis and Design	4 (2-1-2)
ELECTIVE COURSES (Any Four)		
The students can choose any four courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (FSP) programme.		
SM-715	Computer Networks	4 (2-1-2)
SM-716	Information Security	4 (2-1-2)
SM-717	Cloud Computing	4 (2-1-2)
SM-718	Information Architecture	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-721	Mathematical Modelling	4 (3-1-0)
SM-722	System Simulation	4 (2-1-2)
SM-723	Enterprise Resource Planning	4 (3-1-0)
SM-724	Project Management	4 (2-1-2)
ELECTIVE COURSES (Any Three)		
The students can choose any three courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (FSP) programme.		
SM-725	Data Mining and Data Warehousing	4 (2-1-2)
SM-726	e-Business & e-Governance	4 (3-1-0)
SM-727	Management Information Systems	4 (3-1-0)
SM-728	Artificial Intelligence & Neural Networks	4 (2-1-2)
Choice Based Course (Any One): The students can choose any one course from the courses being offered in this semester in other M.Tech. programmes being run in this campus.		

Third & Fourth Semesters:

Code	Title	Credits
SM-800	M.Tech. Thesis	40

M.Tech. in Systems Management
Specialisation: IT Systems

Revised Programme Structure   Batch: 2014-16

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-711	Introduction to Systems Engineering	4 (3-1-0)
SM-712	Operations Research	4 (2-1-2)
SM-713	Database Management Systems	4 (2-1-2)
SM-714	System Analysis and Design	4 (2-1-2)
ELECTIVE COURSES (Any Four)		
The students can choose any four courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (FSP) programme.		
SM-715	Computer Networks	4 (2-1-2)
SM-716	Information Security	4 (2-1-2)
SM-717	Cloud Computing	4 (2-1-2)
SM-718	Information Architecture	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-721	Mathematical Modelling	4 (3-1-0)
SM-722	System Simulation	4 (2-1-2)
SM-723	Enterprise Resource Planning	4 (3-1-0)
SM-724	Project Management	4 (2-1-2)
ELECTIVE COURSES (Any Three)		
The students can choose any three courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (FSP) programme.		

SM-725	Data Mining and Data Warehousing	4 (2-1-2)
SM-726	e-Business & e-Governance	4 (3-1-0)
SM-727	Big Data Analytics	4 (2-1-2)
SM-728	Artificial Intelligence & Neural Networks	4 (2-1-2)
Choice Based Course (Any One): The students can choose any one course from the courses being offered in this semester in other M.Tech. programmes being run in this campus.		

Third & Fourth Semesters:

Code	Title	Credits
SM-800	M.Tech. Thesis	40

SCHOOL OF FUTURE STUDIES AND PLANNING

MEETING OF THE DEPARTMENTAL COMMITTEE
MINUTES OF THE MEETING HELD ON 24/03/2015

The meeting of the departmental committee was held on 24/03/2015 at 4.00 p.m. in the Committee Room at the School. The following persons were present in the meeting:

Dr. V.B.Gupta	Head & Chairman
Mr. Vandit Hedau	Member
Mr. Avinash Navlani	Member

Modification in Existing M.Tech. Programmes:

The current industrial requirements were discussed and analysed. It is recommended that both M.Tech. programmes should be modified as follows for the new batch 2015-17:

1. M.Tech. (Future Studies and Planning) with specialization in Data Analytics: A new course on Information Architecture can be added in place of Technology Management. The syllabus of Information Architecture was discussed and approved.

2. M.Tech. (Systems Management): It is recommended that two generic courses, Technical Communication and Dynamic Modelling, should be introduced. The courses on Mathematical Modelling and System Simulation should be merged in a single course- Modelling and Simulation. The new courses on Statistical Research Methods and Industrial Engineering and Systems should be introduced and the existing course on Computer Networks should be removed. Syllabus for the new added courses was designed and approved.

(Mr. Vandit Hedau)   (Mr. Avinash Navlani)   (Dr. V.B.Gupta)

M.Tech. in Future Studies and Planning

Specialisation: Data Analytics

Programme Structure   Batch: 2014-16

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-711	Forecasting Methods	4 (2-1-2)
FS-712	Operations Research	4 (2-1-2)
FS-713	Statistical Research Methods	4 (2-1-2)
FS-714	RDBMS and NOSQL	4 (2-1-2)
ELECTIVE COURSES (Any Four)		
The students can choose any four courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (SM) programme.		
FS-715	Supply Chain Management	4 (3-1-0)
FS-716	Technology Management	4 (3-1-0)
FS-717	Decision Analysis	4 (2-1-2)
FS-718	Statistical Programming in R	4 (2-1-2)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-721	Technology Forecasting	4 (3-1-0)
FS-722	Data Mining for Analytics	4 (2-1-2)
FS-723	Big Data Analytics	4 (2-1-2)
FS-724	Python for Analytics	4 (2-1-2)
ELECTIVE COURSES (Any Three)		
The students can choose any three courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (SM) programme.		
FS-725	Machine Learning	4 (3-1-0)
FS-726	Industrial Engineering and Systems	4 (3-1-0)
FS-727	System Dynamics	4 (2-1-2)
FS-728	Multivariate Analysis	4 (2-1-2)
Choice Based Course (Any One): The students can choose any one course from the courses being offered in this semester in other M.Tech. programmes being run in this campus.		

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	40

M.Tech. in Future Studies and Planning
Specialisation: Data Analytics

Revised Programme Structure   Batch: 2015-17

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
FS-701	Forecasting Methods	4 (2-1-2)
FS-703	Operations Research	4 (2-1-2)
FS-705	Statistical Research Methods	4 (2-1-2)
FS-707	RDBMS and NOSQL	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-711	Supply Chain Management	4 (3-1-0)
FS-713	Information Architecture	4 (3-1-0)
FS-715	Statistical Programming in R	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
FS-721	Technical Communication	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-702	Technology Forecasting	4 (3-1-0)
FS-704	Data Mining for Analytics	4 (2-1-2)
FS-706	Big Data Analytics	4 (2-1-2)
FS-708	Python for Analytics	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-712	Machine Learning	4 (3-1-0)
FS-714	Industrial Engineering and Systems	4 (3-1-0)
FS-716	System Dynamics	4 (2-1-2)
FS-718	Multivariate Analysis	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
FS-722	Decision Analysis	4 (2-1-2)

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	24

M.Tech. in Systems Management

Specialisation: IT Systems

Programme Structure   Batch: 2014-16

Note: The courses ==highlighted in yellow colour are dropped== and ==highlighted in green colour are introduced== for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-711	Introduction to Systems Engineering	4 (3-1-0)
SM-712	Operations Research	4 (2-1-2)
SM-713	Database Management Systems	4 (2-1-2)
SM-714	System Analysis and Design	4 (2-1-2)
ELECTIVE COURSES (Any Four)		
The students can choose any four courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (FSP) programme.		
SM-715	Computer Networks	4 (2-1-2)
SM-716	Information Security	4 (2-1-2)
SM-717	Cloud Computing	4 (2-1-2)
SM-718	Information Architecture	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-721	Mathematical Modelling	4 (3-1-0)
SM-722	System Simulation	4 (2-1-2)
SM-723	Enterprise Resource Planning	4 (3-1-0)
SM-724	Project Management	4 (2-1-2)
ELECTIVE COURSES (Any Three)		
The students can choose any three courses from following elective courses of this programme and the courses being offered in this semester in M.Tech. (FSP) programme.		
SM-725	Data Mining and Data Warehousing	4 (2-1-2)
SM-726	e-Business & e-Governance	4 (3-1-0)
SM-727	Big Data Analytics	4 (2-1-2)
SM-728	Artificial Intelligence & Neural Networks	4 (2-1-2)
Choice Based Course (Any One): The students can choose any one course from the courses being offered in this semester in other M.Tech. programmes being run in this campus.		

Third & Fourth Semesters:

Code	Title	Credits
SM-800	M.Tech. Thesis	40

M.Tech. in Systems Management
Specialisation: IT Systems

Programme Structure   **Batch: 2015-17**

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-701	Introduction to Systems Engineering	4 (3-1-0)
SM-703	Operations Research	4 (2-1-2)
SM-705	Database Management Systems	4 (2-1-2)
SM-707	Statistical Research Methods	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two):		
SM-711	Information Security	4 (2-1-2)
SM-713	Cloud Computing	4 (2-1-2)
SM-715	System Analysis and Design	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
SM-721	Technical Communication	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-702	Modelling and Simulation	4 (3-1-0)
SM-704	Industrial Engineering and Systems	4 (3-1-0)
SM-706	Enterprise Resource Planning	4 (3-1-0)
SM-708	Project Management	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two):		
SM-712	Data Mining and Data Warehousing	4 (2-1-2)
SM-714	e-Business & e-Governance	4 (3-1-0)
SM-716	Big Data Analytics	4 (2-1-2)
SM-718	Artificial Intelligence & Neural Networks	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
SM-722	Dynamic Modelling	4 (2-1-2)

Third & Fourth Semesters:

Code	Title	Credits
SM-800	M.Tech. Thesis	24

SCHOOL OF DATA SCIENCE AND FORECASTING

MEETING OF THE DEPARTMENTAL COMMITTEE
MINUTES OF THE MEETING HELD ON 10/03/2016

The meeting of the departmental committee was held on 10/03/2016 at 4.30 p.m. in the Committee Room at the School. The following persons were present in the meeting:

Dr. V.B.Gupta   Head & Chairman
Mr. Vandit Hedau   Member

The following items were discussed and resolved:

Item No. 1: Restructuring of M.Tech. Programmes:
The name of the school has been changed from School of Future Studies and Planning to School of Data Science and Forecasting. The academic programmes being offered in this school also need modifications due to following problems:

The school has been offering M.Tech. programme in Future Studies and Planning since 1990. More than twenty five years have been passed and still academia, society and industrial community do not have correct understanding of the programme. Therefore, the students of M.Tech. in Future Studies and Planning do not get appropriate job opportunities. Similarly job opportunities for the students of M.Tech. in Systems Management are limited as systems word is very generic in nature.

Seeing these difficulties it is recommended to redesign and re-name the programmes as follows for new batch 2016-18:

Existing Name	Recommended Name
M.Tech. in Future Studies and Planning	M.Tech. in Data Science
M.Tech. in Systems Management	M.Tech. in Information Systems Management

The contents of both the programmes have also been modified as per new nomenclatures.

Item No. 2: Restructuring of M.B.A. Programme:
The school started M.B.A. programme in Business Forecasting in the year 2008 and discontinued in 2014 as the programme could not attract good number of students due to very limited scope of the Business Forecasting. Therefore, it is recommended to redesign the programme as M.B.A. in Business Analytics. The course contents should also be modified accordingly.

Item No. 3: Requirement of new advanced computer systems:
The school has modified existing programmes based on new innovative courses on data science. As this is new emerging academic field the computer systems with higher RAM and specifications are needed. It is recommended to purchase 20 such computers.

(Mr. Vandit Hedau)   (Dr. V.B.Gupta)

M.Tech. in Future Studies and Planning
Specialisation: Data Analytics

Programme Structure   Batch: 2015-17

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
FS-701	Forecasting Methods	4 (2-1-2)
FS-703	Operations Research	4 (2-1-2)
FS-705	Statistical Research Methods	4 (2-1-2)
FS-707	RDBMS and NOSQL	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-711	Supply Chain Management	4 (3-1-0)
FS-713	Information Architecture	4 (3-1-0)
FS-715	Statistical Programming in R	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
FS-721	Technical Communication	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-702	Technology Forecasting	4 (3-1-0)
FS-704	Data Mining for Analytics	4 (2-1-2)
FS-706	Big Data Analytics	4 (2-1-2)
FS-708	Python for Analytics	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-712	Machine Learning	4 (3-1-0)
FS-714	Industrial Engineering and Systems	4 (3-1-0)
FS-716	System Dynamics	4 (2-1-2)
FS-718	Multivariate Analysis	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
FS-722	Decision Analysis	4 (2-1-2)

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	24

M.Tech. in Future Studies and Planning
Specialization in Data Science
Revised Programme Structure　　　　　　　　Batch: 2016-18

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
FS-701	Operations Research	4
FS-703	Statistical Research Methods	4
FS-705	Data Science and Visualization	4
FS-707	RDBMS and NOSQL	4
FS-709	Python for Analytics	4
FS-711	Laboratory-Advanced Excel	2
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-721	Data Mining and Warehousing	3
FS-723	Statistical Programming in R	3
FS-725	Information Architecture	3
FS-727	Multivariate Analysis	3

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-702	Forecasting Methods	4
FS-704	Hadoop	4
FS-706	Linear Algebra and Advanced Calculus	3
FS-708	Introduction to System Dynamics	3
FS-710	Machine Learning	3
FS-712	Laboratory-Statistical Software Packages (Systat/ SPSS)	2
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-722	Technology Forecasting	3
FS-724	Big Data and Cloud Computing	3
FS-726	Natural Language Processing	3
FS-728	Web Mining	3
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
FS-752	Technical Communication	3

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	24

M.Tech. in Systems Management

Programme Structure   Batch: 2015-17

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-701	Introduction to Systems Engineering	4 (3-1-0)
SM-703	Operations Research	4 (2-1-2)
SM-705	Database Management Systems	4 (2-1-2)
SM-707	Statistical Research Methods	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two):		
SM-711	Information Security	4 (2-1-2)
SM-713	Cloud Computing	4 (2-1-2)
SM-715	System Analysis and Design	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
SM-721	Technical Communication	4 (3-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
SM-702	Modelling and Simulation	4 (3-1-0)
SM-704	Industrial Engineering and Systems	4 (3-1-0)
SM-706	Enterprise Resource Planning	4 (3-1-0)
SM-708	Project Management	4 (2-1-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two):		
SM-712	Data Mining and Data Warehousing	4 (2-1-2)
SM-714	e-Business & e-Governance	4 (3-1-0)
SM-716	Big Data Analytics	4 (2-1-2)
SM-718	Artificial Intelligence & Neural Networks	4 (2-1-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
SM-722	Dynamic Modelling	4 (2-1-2)

Third & Fourth Semesters:

Code	Title	Credits
SM-800	M.Tech. Thesis	24

M.Tech. in Systems Management

Specialization in Information Systems

Batch: 2016-18

Revised Programme Structure

First Semester:

Code	Title	Credits
CORE COURSES		
IS-701	Database Management Systems	4
IS-703	Object Oriented Programming in Java	4
IS-705	Distributed Systems	3
IS-707	Modelling and Simulation	3
IS-709	Probability and Statistics	3
IS-711	System Analysis and Design	3
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
IS-721	Electronic Commerce	4
IS-723	Business Intelligence	4
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
IS-751	Communication Skills	4

Second Semester:

Code	Title	Credits
CORE COURSES		
IS-702	Enterprise Resource Planning	4
IS-704	IT Project Management	4
IS-706	Data Mining and Warehousing	3
IS-708	Big Data and Cloud Computing	3
IS-710	Decision Analysis	3
IS-712	IT Strategy & Management	3
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
IS-722	Information Security Management	4
IS-724	Software Quality Assurance	4
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
IS-752	Technical Communication	4

Third & Fourth Semesters:

Code	Title	Credits
IS-800	M.Tech. Thesis	24

School of Data Science and Forecasting

Minutes of the Meeting of Board of Studies

School of Data Science & Forecasting

Meeting of Board of Studies held on 3/10/16. The following members were present in the meeting:
1. Dr. V. B. Gupta
2. Mr. Vanchit Hedau
3. Dr. K. Venkataraman
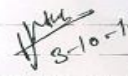
The following syllabus were discussed and approved:
1. Syllabus of Ph.D. Entrance test (Data Science & Forecasting)
2. Syllabus of Ph.D. Course work.

Signed copies of both syllabi are submitted.

(Dr. V. B. Gupta)
Chairman, BOS
3/10/16

(Dr. K. Venkataraman)
Member, BOS
3/10/16

Vanchit Hedau
member, B
3-10-16

Comparison of Syllabus for Ph.D. Course Work

Old Syllabus till 2016	New Syllabus for 2017-18 onwards
RFS-801: Research Methodology - 5 credits (3-1-2): **Unit I:** Foundation of Research: Motivation and objectives – Research methods *vs* Methodology. Types of research – Descriptive *vs.* Analytical, Applied *vs.* Fundamental, Quantitative *vs.* Qualitative, Conceptual *vs.* Empirical. Research Methodology: An Introduction, Research Design: defining and formulating the research problem - selecting the problem - necessity of defining the problem, Methods of Data Collection: Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review, Sampling, Measures of Central Tendencies and Dispersion, Correlation and Regression. Development of working hypothesis, Testing of Hypotheses: Meaning, Basic concepts, Null hypothesis – Alternate Hypothesis – Two types of errors levels of significance of a test – power of a Test. Limitations of Tests of hypothesis. t-test, F-test, Chi-Square test. Analysis and Presentation of Data. Cluster analysis. Factor analysis. Two-variable linear Regression model: Basics, Problem of Estimation, Classical linear Regression Model. Extensions of the Two variable linear model, Multiple Regression Model: Estimation and Inference. **Unit II:** Basic steps in forecasting. Basic forecasting tools: time series and cross sectional data, graphical and numerical summaries, forecasting accuracy, prediction intervals, transformations and adjustments. Time series-moving averages, exponential smoothing methods, ARIMA, comparison of methods. Brain storming and brain writing methods, Delphi method, Growth curves,	**DS-901: Research Methodology: 4 (2-1-2)** Course contents: • Introduction to research, Need, Importance and Characteristics of research, Types of research – An overview, Quantitative and qualitative research, Review of literature • Identification, Definition and Statement of Problem, Variables, Role of variables in research, Research Questions and Objectives • Hypotheses, Hypotheses Testing, Population and Sample, Probability Sampling Techniques, Non - Probability Sampling Techniques • Research Design – An Overview, Philosophical and Historical, Survey, Case Studies • Experimental Designs, Research Tools • Process of Research Tools Designing, Questionnaire Designing, Test Designing, Scale Designing, Scaling Techniques • Process of Standardising Research Tools, Data Analysis Overview • Frequency Distribution, Statistical Tools: Measures of Central Tendency, Measure of Variability, Comparing Means: Independent Sample t-test, Paired Sample t-test, One Way ANOVA, Factorial Design ANOVA, ANCOVA, Correlation, Regression, Factor Analysis and Non-parametric Statistical Techniques. • Report Writing, IPR and Plagiarism, Statistical Software and Research Paper Writing **Text Books:** 1. Kerlinger, F.N: Foundations of Behavioral Research, Surjeet Publication, New Delhi, 1983. 2. Sterling, T. and Pollack, S: Introduction to Statistical Data Processing, Prentice 3. Campbell, W: Forms and style in Thesis Writing, 3rd ed., Boston., Houghton, 4. McNemar, Orinn: Psychological Statistics, John Wiely and Sons, 1960. 5. Molstad, John A.: Selective Review of Research Studies Showing Media Effectiveness: A Primer

substitution curves, Pearl curve, Gompertz curve, Fisher-Pry curve, selection of proper growth curve, estimation of upper limit. Trend extrapolation- exponential trends, non exponential growth, qualitative trends.

Unit III:
Systems approach: Systems thinking, feedback-positive & negative, steady state behaviour. System dynamics methodology: reservoirs, processes, converters, interrelationships. Modelling concepts. Applications to different systems.

Unit IV:
The Structure of the Dissertation, Literature Review: Purpose, Finalising Dissertation Topics and Statement of the Problem, Formulating Hypotheses and Research Questions, Identifying the Methodology to be used, Preparing the Bibliography, Dissertation Titles and Draft Proposals, Dissertation Chapters and time-line, Proposal Presentation and Approval.

Essential Readings:
1. C.R.Kothari, Research Methodology: Methods and Techniques, New Age International Publishers
3. Michael L Deaton, James J. Winebrake, Dynamic Modelling of Environmental Systems, Springer
4. Spyros Makridakis, Steven C Wheelright, Rob J Hyndman, Forecasting Methods and Applications, Wiley
5. Joseph P Martino, Technological Forecasting for Decision Making, Mc Graw Hill
6. Oliver, Paul, Writing Your Thesis, New Delhi: Sage.
7. Mauch, James E. and Jack Birch, Guide to the Successful Thesis and Dissertation: A Handbook for Students and Faculty, CRC Press, New York | for Media Director. AV communication review vol.22, 1974. |
| **RFS-802: Computer Applications-3 Credits (2-0-2):**
MS Word, MS Excel, MS Power point, SPSS/SYSTAT, MATLAB/ SCI Lab., TORA. | **DS-903: Computer Applications: 3 (1-0-4)**
Unit I: Basic Knowledge of Computer
Unit II: Use of Computer in Research
Unit III: Use of technology and other equipment in Research |

	Unit IV: Data Analysis Softwares and Analysis Techniques (SPSS)/MATLAB • MS Excel • MS Office • Power Point Presentations • Use of Internet for Research Purpose • Introduction to UGCinfonet, INFLIBNET and ERNET etc. Unit V: Practical Work

RFS-803: Literature Review (3 Credits)	**DS-902: Review of Published Research: 3 (0-0-6)**
	Introduction to Literature Review
	Problem Identification
	Process of Literature Review
	      o Searching for related literature to research problem
	      o Methods of organizing the literature
	      o Synthesize the results
	      o Finalize the review

	DS- 904: Predictive Analytics 3 (2-0-2) **Unit-I** Overview of Predictive Analytics: Supervised and Unsupervised learning, Parametric and non-parametric models, Business Intelligence, Data mining, etc. Problem identification: Predictive analytics processing steps, business understanding, defining data for analytics, defining target variable, measures of success. Data Understanding: Single variable summaries- mean, standard deviation, Normal distribution, Uniform distribution, Data understanding with simple statistics. Data visualisation in one dimension, Multiple variables summaries- Correlation, etc. Data visualisation in multiple dimensions. **Unit-II** Data preparation-Variable cleaning, feature creation. Itemsets and association rules- terminology, parameter settings, measures of interesting rules, deploying association rules, problems, with association rules, building

	classification and association rules. Descriptive modelling-principal component analysis, Clustering algorithms. Interpreting Descriptive models.
	Unit-III
	Predictive modelling-Decision tress, Logistic regression, neural networks, K-nearest neighbour, Naïve Bayes, Regression models, Linear regression. Assessing Predictive Models.
	Unit-IV
	Model ensembles, Text mining, Model deployment. Case studies.
	Books:
	1. Dean Abbott , Applied Predictive Analytics, WILEY, 2014
	2. Eric Siegel , Predictive Analytics, WILEY, 2016
	3. Anasse Bari, Mohamed Chaouchi, and Tommy Jung, Predictive Analytics For Dummies, WILEY, 2016
	4. Max Kuhn, Kjell Johnson, Applied Predictive Modeling, Springer Science & Business Media, 2013.
RFS-804: Comprehensive Via Voce (4 credits)	**DS-905:** Comprehensive Viva-Voce 3

SCHOOL OF DATA SCIENCE AND FORECASTING

MEETING OF THE DEPARTMENTAL COMMITTEE
MINUTES OF THE MEETING HELD ON 12/04/2017

The meeting of the departmental committee was held on 12/04/2017 at 4.00 p.m. in the Committee Room at the School. The following persons were present in the meeting:

Dr. V.B.Gupta   Head & Chairman
Mr. Vandit Hedau   Member

The following items were discussed and resolved:

Item No. 1: Modification in M.Tech. FSP Programme:
The Executive Council of the University has approved new name of M.Tech. (Future Studies and Planning) programme as M.Tech. (Data Science). A course on Hadoop should be replaced new course on Big data Technologies comprising Hadoop and Spark. Syllabus of the new course on Big data Technologies is discussed and approved.

Item No. 2: New Academic Programmes:
The following new academic programmes were developed and recommended for approval of the Executive Council:

1. M.B.A. programme in Business Analytics
2. M.Sc. in Data Science and Analytics

Detailed syllabi of both programmes were developed and approved.

(Mr. Vandit Hedau)   (Dr. V.B.Gupta)

M.Tech. in Future Studies and Planning
Specialization in Data Science

Batch 2016-18

Curriculum

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
FS-701	Operations Research	4
FS-703	Statistical Research Methods	4
FS-705	Data Science and Visualization	4
FS-707	RDBMS and NOSQL	4
FS-709	Python for Analytics	4
FS-711	Laboratory-Advanced Excel	2
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-721	Data Mining and Warehousing	3
FS-723	Statistical Programming in R	3
FS-725	Information Architecture	3
FS-727	Multivariate Analysis	3

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
FS-702	Forecasting Methods	4
FS-704	Hadoop	4
FS-706	Linear Algebra and Advanced Calculus	3
FS-708	Introduction to System Dynamics	3
FS-710	Machine Learning	3
FS-712	Laboratory-Statistical Software Packages (Systat/ SPSS)	2
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
FS-722	Technology Forecasting	3
FS-724	Big Data and Cloud Computing	3
FS-726	Natural Language Processing	3
FS-728	Web Mining	3
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
FS-752	Technical Communication	3

Third & Fourth Semesters:

Code	Title	Credits
FS-800	M.Tech. Thesis	24

Revised Curriculum

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
DS-701	Operations Research	4 (3-1-0)
DS-703	Statistical Research Methods	4 (2-1-2)
DS-705	Data Science and Visualisation	3 (2-0-2)
DS-707	RDBMS and NOSQL	3 (2-0-2)
DS-709	Python for Analytics	3 (2-0-2)
DS-711	Laboratory-Advanced Excel	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS-721	Data Mining and Warehousing	3 (2-0-2)
DS-723	Statistical Programming in R	3 (2-0-2)
DS-725	Multivariate Analysis	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS-751	Communication Skills	3(2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS-702	Forecasting Methods	4(2-1-2)
DS-704	Big Data Technologies	3(2-0-2)
DS-706	Linear Algebra and Advanced Calculus	3(2-1-0)
DS-708	System Dynamics	3(2-0-2)
DS-710	Machine Learning	3(2-0-2)
DS-712	Technology Forecasting	3(2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS-722	Cloud Computing	3(2-1-0)
DS-724	Natural Language Processing	3(2-0-2)
DS-726	Web Mining	3(2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS-752	Technical Communication	3(2-1-0)

Third & Fourth Semesters:

Code	Title	Credits
DS-800	M.Tech. Thesis	24

New Curriculum

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
BA-501	Principles of Management	3 (2-1-0)
BA-503	Organisational Behaviour	3 (2-1-0)
BA-505	Business Mathematics and Statistics	3 (2-1-0)
BA-507	Principles of Economics	3 (2-1-0)
BA-509	Database Management	3 (2-0-2)
BA-511	Python for Analytics	3 (2-0-2)
BA-513	Spreadsheet Modelling	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
BA-521	Fundamentals of Algorithms	3 (2-0-2)
BA-523	Decision Analysis	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
BA-551	Communication Skills	3 (2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
BA-502	Operations Research	3 (2-1-0)
BA-504	Marketing Management	3 (2-1-0)
BA-506	Financial Management	3 (2-1-0)
BA-508	Big Data Technologies	3 (2-0-2)
BA-510	Data Mining and Data Warehousing	3 (2-0-2)
BA-512	Machine Learning	3 (2-0-2)
BA-514	Programming in R	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
BA-522	Business Intelligence	3 (2-0-2)
BA-524	Business Dynamics	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
BA-552	Research Methodology	3 (2-1-0)

Third Semester:

Code	Title	Credits (L T P)
CORE COURSES		
BA-601	Forecasting Methods	3 (2-1-0)
BA-603	Project Management	3 (2-1-0)
BA-605	Supply Chain Management	3 (2-1-0)
BA-607	Econometrics	3 (2-1-0)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
BA-621	Marketing Analytics	3 (2-0-2)

BA-623	Financial Analytics	3 (2-0-2)
BA-625	Operations & Supply Chain Analytics	3 (2-0-2)

Fourth Semester:

Code	Title	Credits (L T P)
Project		
BA-602	Major Research Project / Industry Internship	12

M.Sc. (Data Science & Analytics)

New Curriculum

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS-501	Database Management	3 (2-0-2)
DS-503	Forecasting Methods-I	3 (2-1-0)
DS-505	Operations Research	4 (3-1-0)
DS-507	Probability and Statistics	3 (2-1-0)
DS-509	Python for Analytics	3 (2-0-2)
DS-511	Advanced Excel	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS-521	Fundamentals of Algorithms	3 (2-0-2)
DS-523	Decision Analysis	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
DS-551	Communication Skills	3 (2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS-502	Data Mining and Data Warehousing	3 (2-1-0)
DS-504	Data Visualization	3 (2-1-0)
DS-506	Forecasting Methods-II	3 (2-0-2)
DS-508	Linear Algebra and Advanced Calculus	3 (2-1-0)
DS-510	Big Data Technologies	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS-522	Statistical Programming in R	3 (2-0-2)
DS-524	Scientific Computing	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
DS-552	Technical Communication	3 (2-1-0)

Third Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS-601	Cloud Computing	3 (2-1-0)

DS-603	Machine Learning	3 (2-0-2)
DS-605	Research Methodology	3 (2-1-0)
DS-607	Non Linear Optimization	3 (2-1-0)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS-621	Cluster Analysis	3 (2-1-0)
DS-623	Multivariate Analysis	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
DS-651	Numerical Methods	3 (2-1-0)

Fourth Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS-602	Deep Learning	3 (2-1-0)
DS-604	Internet of Things	3 (2-0-2)
DS-606	Web Mining	3 (2-0-2)
ELECTIVE COURSES (Any one)		
The students can choose any one course from following elective courses.		
DS-622	Natural Language Processing	4 (2-1-2)
DS-624	Social Network Analysis	4 (2-1-2)
Project		
DS-652	Project Dissertation	4 (0-0-8)

SCHOOL OF DATA SCIENCE AND FORECASTING

MEETING OF THE DEPARTMENTAL COMMITTEE
MINUTES OF THE MEETING HELD ON 27/04/2018

The meeting of the departmental committee was held on 27/04/2018 at 3.30 p.m. in the Committee Room at the School. The following persons were present in the meeting:

Dr. V.B.Gupta   Head & Chairman
Mr. Vandit Hedau   Member

The following items were discussed and resolved:

Item No. 1: Modification in M.Tech. Data Science Programme:
The following courses can be removed by the new courses as follows:
Data Science and Visualization by Data Visualization
System Dynamics by Modelling and Simulation
Technology Forecasting by Scientific Computing.

Syllabi of the new added courses were developed and approved.

Item No. 2: Modification in M.Tech. Big Data Analytics Programme:
The Coordination committee has approved change of name from M.Tech. (Systems Management) to M.Tech. (Big Data Analytics). Entire programme structure has been changed as per new name for the session 2018-20. Syllabi of the all the courses were developed and approved.

Item No. 3: Modification in M.B.A. (Business Analytics) Programme:
The following courses can be removed by the new courses as follows:
Business Mathematics and Statistics by Probability and Statistics
Communication Skills by Business Communication
Business Intelligence by Business Mathematics
Business Dynamics by Data Visualization

Syllabi of the new added courses were developed and approved.

Item No. 4: New Academic Programmes:
The following new academic programmes were developed and recommended for approval of the Executive Council:

M.Tech. in Data Science for Working Executives.

Detailed syllabi of the programme were developed and approved.

(Mr. Vandit Hedau)   (Dr. V.B.Gupta)

M.Tech. (Data Science)   Batch: 2017-19

Curriculum

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
DS-701	Operations Research	4 (3-1-0)
DS-703	Statistical Research Methods	4 (2-1-2)
DS-705	Data Science and Visualisation	3 (2-0-2)
DS-707	RDBMS and NOSQL	3 (2-0-2)
DS-709	Python for Analytics	3 (2-0-2)
DS-711	Laboratory-Advanced Excel	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS-721	Data Mining and Warehousing	3 (2-0-2)
DS-723	Statistical Programming in R	3 (2-0-2)
DS-725	Multivariate Analysis	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS-751	Communication Skills	3(2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS-702	Forecasting Methods	4(2-1-2)
DS-704	Big Data Technologies	3(2-0-2)
DS-706	Linear Algebra and Advanced Calculus	3(2-1-0)
DS-708	System Dynamics	3(2-0-2)
DS-710	Machine Learning	3(2-0-2)
DS-712	Technology Forecasting	3(2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS-722	Cloud Computing	3(2-1-0)
DS-724	Natural Language Processing	3(2-0-2)
DS-726	Web Mining	3(2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS-752	Technical Communication	3(2-1-0)

Third & Fourth Semesters:

Code	Title	Credits
DS-800	M.Tech. Thesis	24

M.Tech. (Data Science)   Batch: 2018-20

Revised Curriculum

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
DS7A-701	Operations Research	4 (3-1-0)
DS7A-703	Statistical Research Methods	4 (3-1-0)
DS7A-705	Data Visualization	3 (2-0-2)
DS7A-707	RDBMS and NOSQL	3 (2-0-2)
DS7A-709	Python for Analytics	3 (2-0-2)
DS7A-711	Laboratory-Advanced Excel	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS7A-721	Cloud Computing	3 (2-1-0)
DS7A-723	Statistical Programming in R	3 (2-0-2)
DS7A-725	Multivariate Analysis	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS7A-751	Fundamentals of Algorithms	3 (2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS7A-702	Forecasting Methods	4 (2-1-2)
DS7A-704	Big Data Technologies	3 (2-0-2)
DS7A-706	Linear Algebra and Advanced Calculus	3 (2-1-0)
DS7A-708	Modelling and Simulation	3 (2-0-2)
DS7A-710	Machine Learning	3 (2-0-2)
DS7A-712	Data Mining and Warehousing	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS7A-722	Scientific Computing	3 (2-1-0)
DS7A-724	Natural Language Processing	3 (2-0-2)
DS7A-726	Web Mining	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS7A-752	Technical Communication	3 (2-1-0)

Third & Fourth Semesters:

Code	Title	Credits
DS7A-800	M.Tech. Dissertation	24

M.Tech. (Big Data Analytics)   Batch: 2018-20

New Curriculum

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
DS7B-701	Statistical Computing	3 (2-1-0)
DS7B-703	Linear Algebra and Advanced Calculus	3 (2-1-0)
DS7B-705	Data Mining and Data Warehousing	3 (2-0-2)
DS7B-707	Next Generation Databases	3 (2-0-2)
DS7B-709	Python for Analytics	3 (2-0-2)
DS7B-711	Advanced Excel Lab.	3 (0-0-6)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS7B-721	Statistical Programming in R	3 (2-0-2)
DS7B-723	Multivariate Analysis	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS7B-751	Communication Skills	3 (2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS7B-702	Forecasting Methods	3 (2-1-0)
DS7B-704	Big Data Technologies	3 (2-0-2)
DS7B-706	Machine Learning	3 (2-0-2)
DS7B-708	Java	3 (2-0-2)
DS7B-710	Data Visualization	3 (2-0-2)
DS7B-712	Web Mining	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
SD7B-722	Functional Programming	3 (2-0-2)
DS7B-724	Natural Language Processing	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS7B-752	Technical Communication	3 (2-1-0)

Third Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS7B-801	Operations Research	4 (2-1-2)
DS7B-803	Algorithms for Data Analytics	3 (2-0-2)
DS7B-805	Cloud Computing	3 (2-1-0)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any Two)		
DS7B-821	Pattern Recognition	3 (2-0-2)

Code	Title	Credits
DS7B-823	Predictive Analytics	3 (2-1-2)
DS7B-825	Internet of Things	3 (2-1-0)
DS7B-827	Virtual Realty	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any generic course being offered in other M.Tech. programmes being run in this campus.		
DS7B-851	Minor Project	4 (0-0-8)

Fourth Semester:

Code	Title	Credits
DS7B-802	M.Tech. Dissertation	12

M.B.A. (Business Analytics)   Batch: 2017-19

Curriculum

Note: The courses highlighted in yellow colour are dropped and highlighted in green colour are introduced for the next batch.

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
BA-501	Principles of Management	3 (2-1-0)
BA-503	Organisational Behaviour	3 (2-1-0)
BA-505	Business Mathematics and Statistics	3 (2-1-0)
BA-507	Principles of Economics	3 (2-1-0)
BA-509	Database Management	3 (2-0-2)
BA-511	Python for Analytics	3 (2-0-2)
BA-513	Spreadsheet Modelling	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
BA-521	Fundamentals of Algorithms	3 (2-0-2)
BA-523	Decision Analysis	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
BA-551	Communication Skills	3 (2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
BA-502	Operations Research	3 (2-1-0)
BA-504	Marketing Management	3 (2-1-0)
BA-506	Financial Management	3 (2-1-0)
BA-508	Big Data Technologies	3 (2-0-2)
BA-510	Data Mining and Data Warehousing	3 (2-0-2)

BA-512	Machine Learning	3 (2-0-2)
BA-514	Programming in R	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
BA-522	Business Intelligence	3 (2-0-2)
BA-524	Business Dynamics	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
BA-552	Research Methodology	3 (2-1-0)

Third Semester:

Code	Title	Credits (L T P)
CORE COURSES		
BA-601	Forecasting Methods	3 (2-1-0)
BA-603	Project Management	3 (2-1-0)
BA-605	Supply Chain Management	3 (2-1-0)
BA-607	Econometrics	3 (2-1-0)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
BA-621	Marketing Analytics	3 (2-0-2)
BA-623	Financial Analytics	3 (2-0-2)
BA-625	Operations & Supply Chain Analytics	3 (2-0-2)

Fourth Semester:

Code	Title	Credits (L T P)
Project		
BA-602	Major Research Project / Industry Internship	12

M.B.A. (Business Analytics)   Batch: 2018-20

Revised Curriculum

First Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS5A-501	Principles of Management	3 (2-1-0)
DS5A-503	Database Management	3 (2-0-2)
DS5A-505	Principles of Economics	3 (2-1-0)
DS5A-507	Probability and Statistics	3 (2-1-0)
DS5A-509	Python for Analytics	3 (2-0-2)
DS5A-511	Spreadsheet Modelling	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS5A-521	Fundamentals of Algorithms	3 (2-0-2)
DS5A-523	Decision Analysis	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic		

	course being run in this campus.	
DS5A-551	Business Communication	3 (2-1-0)

Second Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS5A-502	Organisational Behaviour	3 (2-1-0)
DS5A-504	Operations Research	4 (3-1-0)
DS5A-506	Data Mining and Data Warehousing	3 (2-0-2)
DS5A-508	Business Mathematics	3 (2-1-0)
DS5A-510	Statistical Programming in R	3 (2-0-2)
DS5A-512	Machine Learning	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS5A-522	Marketing Management	3 (2-1-0)
DS5A-524	Financial Management	3 (2-1-0)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
DS5A-552	Research Methodology	3 (2-1-0)

Third Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS5A-601	Forecasting Methods	3 (2-1-0)
DS5A-603	Econometrics	3 (2-1-0)
DS5A-605	Supply Chain Management	3 (2-1-0)
DS5A-607	Big Data Technologies	3 (2-0-2)
DS5A-609	Data Visualization	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One)		
DS5A-621	Marketing Analytics	3 (2-0-2)
DS5A-623	Financial Analytics	3 (2-0-2)
ELECTIVE GENERIC: The students can choose following course or any other PG level generic course being run in this campus.		
DS5A-651	Strategic Management	3 (2-1-0)

Fourth Semester:

Code	Title	Credits (L T P)
Project		
DS5A-602	Major Research Project / Industry Internship	12

M.Tech. (Data Science) for Working Executives

Batch: 2018-20

New Curriculum

First Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
D7SE-701	RDBMS and NOSQL	3 (2-0-2)
DS7E-703	Statistical Research Methods	4 (3-1-0)
DS7E-705	Python for Analytics	4 (2-0-2)
DS7E-707	Advanced Excel	2 (0-0-4)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One) through Online		
DS7E-721	Data Mining and Data Warehousing	3 (2-0-2)
DS7E-723	Multivariate Analysis	3 (2-0-2)
ELECTIVE GENERIC:		
DS7E-751	Minor Project-I	4 (0-0-8)

Second Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
DS7E-702	Operations Research	4 (3-1-0)
DS7E-704	Statistical Programming in R	3 (2-0-2)
DS7E-706	Linear Algebra and Advanced Calculus	3 (2-1-0)
DS7E-708	Machine Learning	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One) through Online		
DS7E-722	Cloud Computing	3 (2-1-0)
DS7E-724	Web Mining	3 (2-0-2)
ELECTIVE GENERIC:		
DS7E-752	Minor Project-II	4 (0-0-8)

Third Semester:

Code	Title	Credits (L-T-P)
CORE COURSES		
DS7E-801	Forecasting Methods	4 (3-1-0)
DS7E-803	Data Visualization	3 (2-0-2)
DS7E-805	Decision Analysis	3 (2-1-0)
DS7E-807	Data Security	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One) through Online		
DS7E-821	Deep Learning	3 (2-1-0)
DS7E-823	Technical Communication	3 (2-0-2)
ELECTIVE GENERIC:		
DS7E-851	Minor Project-III	4 (0-0-8)

Fourth Semester:

Code	Title	Credits (L T P)
CORE COURSES		
DS7E-802	Modelling and Simulation	4 (2-1-2)
DS7E-804	Big Data Technologies	3 (2-0-2)
DS7E-806	Scientific Computing	3 (2-1-0)
DS7E-808	Internet of Things (IOT)	3 (2-0-2)
ELECTIVE COURSES-DISCIPLINE CENTRIC (Any One) through Online		
DS7E-822	Natural Language Processing	3 (2-0-2)
DS7E-824	Social Network Analysis	3 (2-0-2)
ELECTIVE GENERIC:		
DS7E-852	Minor Project-IV	4 (0-0-8)

SCHOOL OF DATA SCIENCE AND FORECASTING

MEETING OF THE DEPARTMENTAL COMMITTEE
MINUTES OF THE MEETING HELD ON 20/07/2018

The meeting of the departmental committee was held on 20/07/2018 at 4.30 p.m. in the Committee Room at the School. The following persons were present in the meeting:

Dr. V.B.Gupta   Head & Chairman
Mr. Vandit Hedau   Member

The following items were discussed and resolved:

Item No. 1: Modification in Ph.D. Course work syllabus:
The syllabus of course code-DS9Z-903-Computer Applications is modified and approved.
A course DS9Z-904-Predictive Analytics is replaced by DS9Z-904-Forecasting Methods. The syllabus of Forecasting Methods if developed and approved.
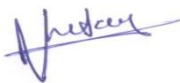
Item No. 2: Purchase of Books:
The school has started several new programs on Data Science and there is shortage of the relevant books in departmental library. Therefore, it is recommended that required books should be categorised as per publishers and should be purchased as soon as possible as per books and journals purchase rules.

Item No. 3: Purchase of computers:
There are only 20 computers in working condition but these computers do not support required specifications for Big Data Technologies. Therefore, it is recommended to purchase 30 more computers with needed specifications.

(Mr. Vandit Hedau)   (Dr. V.B.Gupta)

Comparison of Syllabus for Ph.D. Course Work

Syllabus Offered in 2017	New Syllabus for 2018
DS-901: Research Methodology: 4 (2-1-2) Course contents: • Introduction to research, Need, Importance and Characteristics of research, Types of research – An overview, Quantitative and qualitative research, Review of literature • Identification, Definition and Statement of Problem, Variables, Role of variables in research, Research Questions and Objectives • Hypotheses, Hypotheses Testing, Population and Sample, Probability Sampling Techniques, Non - Probability Sampling Techniques • Research Design – An Overview, Philosophical and Historical, Survey, Case Studies • Experimental Designs, Research Tools • Process of Research Tools Designing, Questionnaire Designing, Test Designing, Scale Designing, Scaling Techniques • Process of Standardising Research Tools, Data Analysis Overview • Frequency Distribution, Statistical Tools: Measures of Central Tendency, Measure of Variability, Comparing Means: Independent Sample t-test, Paired Sample t-test, One Way ANOVA, Factorial Design ANOVA, ANCOVA, Correlation, Regression, Factor Analysis and Non-parametric Statistical Techniques. • Report Writing, IPR and Plagiarism, Statistical Software and Research Paper Writing.	**DS9Z-901: Research Methodology: 4 (2-1-2)** **Unit-I:** Introduction to research, Need, Importance and Characteristics of research, Types of research – An overview, Quantitative and qualitative research, Review of literature. Identification, Definition and Statement of Problem, Variables, Role of variables in research, Research Questions and Objectives. **Unit-II:** Hypotheses, Hypotheses Testing, Population and Sample, Probability Sampling Techniques, Non - Probability Sampling Techniques. **Unit-III:** Research Design – An Overview, Philosophical and Historical, Survey, Case Studies. Experimental Designs, Research Tools. Process of Research Tools Designing, Questionnaire Designing, Test Designing, Scale Designing, Scaling Techniques. Process of Standardising Research Tools, Data Analysis Overview. **Unit-IV:** Frequency Distribution, Statistical Tools: Measures of Central Tendency, Measure of Variability, Comparing Means: Independent Sample t-test, Paired Sample t-test, One Way ANOVA, Factorial Design ANOVA, ANCOVA, Correlation, Regression, Factor Analysis and Non-parametric Statistical Techniques. Report Writing, IPR and Plagiarism, Statistical Software and Research Paper Writing. ==(No Change in this course. The syllabus in distributed in 4 units.)==
DS-902: Review of Published Research: 3 (0-	**DS9Z-902: Review of Published Research: 3 (0-0-6)**

0-6)
 Introduction to Literature Review
 Problem Identification
 Process of Literature Review
     o Searching for related literature to research problem
     o Methods of organizing the literature
     o Synthesize the results
     o Finalize the review
	• Introduction to Literature Review
	 • Problem Identification
	 • Process of Literature Review
	     o Searching for related literature to research problem
	     o Methods of organizing the literature
	     o Synthesize the results
	     o Finalize the review
	
	 (No Change in this course).

DS-903: Computer Applications: 3 (1-0-4) Unit I: Basic Knowledge of Computer Unit II: Use of Computer in Research Unit III: Use of technology and other equipment in Research Unit IV: Data Analysis Softwares and Analysis Techniques (SPSS)/MATLAB • MS Excel • MS Office • Power Point Presentations • Use of Internet for Research Purpose • Introduction to UGCinfonet, INFLIBNET and ERNET etc. Unit V: Practical Work	**DS9Z-903: Computer Applications: 3 (2-0-2)** **Unit I: Basic Knowledge of Computer:** System software, Application software, introduction to operating system, single user, multi-user, multi-tasking single tasking, application of computer for research, MS-windows, Linux. Data Communication and Networks: Data communication concepts, local area network, wide area network, internet, intranet, extranet, website. E-mail, search engines-enterprise E-communication and E-collaboration **Unit II: Use of Internet in Research:** Introduction to internet, INFLIBNET, sights (DOAJ), searching on the internet, Using graphics on internet, E-mail. The use of multimedia on the internet, Security on the internet, Exploring e-mail facilities. Internet and the society, study of search engines, Use of EBSCO HOST online database of Academic Libraries. Use of E-Journals, Use of E-library, searching the keyword search engines. **Unit III: Use of Softwares in Research:** Introduction to Data analysis software-SPSS: Definition, objectives and features, data analysis using SPSS: Data entry creating variables, switching to data labels, data analysis: Frequencies, recording into different variables, cross tabulations and layers. MATLAB. **Unit V: Research Related Tools and Utilities:** MS-Office and its application, File handing in window, various versions of MSOffice, Research

	publishing tool- MS-word, Adobe acrobat, Graphics tool- MSexcel. MS-Power Point: Creating presentations and adding effects. Subject/Field specific tools on www.freeware.com <mark>(Detailed syllabus has been prepared with more than 60% new additions.)</mark>
DS- 904: Predictive Analytics 3 (2-0-2) **Unit-I** Overview of Predictive Analytics: Supervised and Unsupervised learning, Parametric and non- parametric models, Business Intelligence, Data mining, etc. Problem identification: Predictive analytics processing steps, business understanding, defining data for analytics, defining target variable, measures of success. Data Understanding: Single variable summaries- mean, standard deviation, Normal distribution, Uniform distribution, Data understanding with simple statistics. Data visualisation in one dimension, Multiple variables summaries-Correlation, etc. Data visualisation in multiple dimensions. **Unit-II** Data preparation-Variable cleaning, feature creation. Item sets and association rules-terminology, parameter settings, measures of interesting rules, deploying association rules, problems, with association rules, building classification and association rules. Descriptive modeling - principal component analysis, Clustering algorithms. Interpreting Descriptive models. **Unit-III** Predictive modelling-Decision tress, Logistic regression, neural networks, K-nearest neighbour, Naïve Bayes, Regression models, Linear regression. Assessing Predictive	**DS9Z-904: Forecasting Methods** **Credits: 3 (2-0-2)** **COURSE OBJECTIVE** This subject is designed in such a way to provide the basic concepts of forecasting models based on quantitative analysis. Risk and uncertainty in forecasting and it is generally considered good practice to indicate the degree of uncertainty attaching to forecasts. **COURSE DESCRIPTION:** **Unit I: Introduction:** Forecasting perspective, an overview of forecasting methods, basic steps in forecasting. Basic forecasting tools: time series and cross-sectional data, graphical and numerical summaries, forecasting accuracy, prediction intervals, transformations and adjustments. **Unit II: Time series:** Decomposition, principles of decomposition, moving averages, classical decomposition, census bureau methods, forecasting and decomposition. **Unit III:** Exponential smoothing: averaging methods, Single exponential smoothing methods, ARRSES, Double exponential soothing methods, comparison of methods, general aspects of smoothing methods. **Unit IV: Regression:** Simple regression, forecasting with simple regression, non-linear relationships. Multiple regressions. Box-Jenkins methods: examining correlations in time series data, examining stationary, ARIMA models, forecasting with ARIMA models. <mark>**(New Addition of the Course)**</mark>

Models. **Unit-IV** Model ensembles, Text mining, Model deployment. Case studies.	