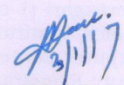## UNIVERSITY OF MUMBAI
No. UG/213 of 2016-17

CIRCULAR:-

A reference is invited to the Syllabi relating to the Ph. D. Course Work **vide** this office Circular No.UG/121 of 2015-16, dated 24th November, 2015 and the Directors/Heads of the University Departments, Dean/Principals of the affiliated Colleges in Faculty of Technology and Engineering, Pharmacy, Architecture and MCA. are hereby informed that proposal received from Co-ordinator Faculty of Technology, approved by the Academic Council at its meeting held on 30th September, 2016 **vide** item No. 4.17 and in accordance therewith, the revised syllabus as per the Choice Based Credit System of Ph. D. Course Work for Engineering Faculty, which is available on the University's web site (www.mu.ac.in) and that the same has been brought into force with effect from the academic year 2017–2018.

MUMBAI – 400 032   (Dr.M.A.Khan)
4th January, 2017   REGISTRAR

To,
    The Directors/Heads of the University Departments, Dean/Principals of the affiliated colleges in Faculty of Technology and Engineering, Pharmacy, Architecture and MCA.
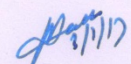**A.C/4.17/30.09.2016**

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No. UG/213 -A of 2016-17   MUMBAI-400 032   4th January, 2017
Copy forwarded with Compliments for information to:-

1) The Co-ordinator, faculties of Technology and Engineering,
2) The Chairman & Chairperson of the board of Studies & Ad-Hoc Board of Studies of various subject at faculty of Technology and Engineering, Pharmacy, Architecture and MCA,
3) The Director, Board of College and University Development,
4) The Co-Ordinator, University Computerization Centre,
5) The Controller of Examinations.

(Dr.M.A.Khan)
REGISTRAR

PTO..

UNIVERSITY OF MUMBAI

Revised Syllabus for PhdCourse Work

(As per Credit Based Semester and Grading System with effect from the academic year 2017–2018)

Course Work Structure for Phd Program in Faculty of Technology
Mumbai University
(With effect from Academic Year 2017-18)

CODE	NAME OF COURSE	CONTACT HOURS	CREDITS	EXAMINATION SCHEME				
				MID TERM TEST	END SEMESTER EXAM	TERM WORK	SEMINAR PRESENTATION	TOTAL
Phd101	Research Methodology	6	6	20	80	--	--	100
Phd102	Course suggested by Guide*	6	6	20	80	--	--	100
Phd103	Seminar	-	4	-	-	50	50	100
Total		12	16	40	160	50	50	300

Grading of Research Candidates Performance

Awarding of gradesto research candidates based on their performance shall be done as per the applicable ordinances and regulations for undergraduate and Post graduate programs of Engineering under the Faculty of Technology. Semester Grade Point Index (SGPI) shall be also calculated based on the ordinances and regulations applicable for engineering programs under Faculty of Technology. Approved and recognized Research Centers shall prepare Phd course work grade card after successful completion of course work and issue to candidates and one copy to University concerned section for record.

Course Code	Course Name	Credits
PhdC101	**Research Methodology**	**06**

Module	Detailed content	Hrs.
1	**Definition and Characteristics of Research:** Research – Definition; Concept of Construct, Postulate, Proposition, Thesis, Hypothesis, Law, Principle. Philosophy and validity of research. Objective of research. Various functions that describe characteristics of research such as systematic, valid, verifiable, empirical and critical approach.	8
2	**Types of Research:** Pure and applied research. Descriptive and explanatory research. Qualitative and quantitative approaches. Formulating the Research Problem, Literature Review, Developing the objectives, Preparing the research design including sample Design, Sample size.	10
3	**Outcome of Research:** Relevance, interest, available data, choice of data, Analysis of data, Generalization and interpretation of analysis, Preparation of the Report on conclusions reached, Testing validity of research outcomes, Suggestions and recommendations, identifying future scope.	10
4	**Probability Distribution and Hypothesis Testing:** Theoretical: binomial, poisson, normal, exponential, hyper geometric, uniform distributions. Type I and II error, testing of mean, proportion, tests for equality of mean and variances of two populations, confidence interval, Z test and χ^2 test for goodness of fit, ANOVA (one way classification), Non parametric tests: sign test, U test.	14
5	**Correlation and Regression Analysis**: Karl Pearson's and Rank Correlation coefficient, simple linear regression: least squares method, Linear Programming:Graphical solution, simplex method, dual, sensitivity analysis, transportation and assignment problems.	10
6	**Management Decision Making & Computer Applications:** System approach, decision making under uncertainty and risk: decision tables and decision tree. Statistical data analysis: generating charts/ graph and other features. Introduction to tools: Tools used may be Microsoft Excel, Open office, Microsoft Power Point or similar tools.	8

References:
1. Dawson, Catherine, 2002, *Practical Research Methods,* New Delhi, UBS Publishers' Distributors.
2. Kothari, C.R.,1985, *Research Methodology-Methods and Techniques,* New Delhi, Wiley Eastern Limited.
3. Kumar, Ranjit, 2005, *Research Methodology-A Step-by-Step Guide for Beginners*, (2nd.ed), Singapore, Pearson Education.
4. *Shrivastava, Shenoy& Sharma, Quantitative Techniques for Managerial Decisions, Wiley*
5. Goode W J &Hatt P K, Methods in social research, McGraw Hill
6. Basic Computer Science and Communication Engineering – R. Rajaram (SCITECH)

Course Code	Course Name	Credits
PhdC102	**Course suggested by Guide***	**06**

This courseis to be suggested by guide/supervisor in specific domain area of research undertaken by the research candidate.

Research candidates can undertake this course in consultation with guide/supervisor as per guidelines given below;

1. Relevant course shall be successfully completed in IITBombay which has 6 credits.

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OR

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1. Relevant PG course in the research domain area of research candidate at any PG center affiliated to University of Mumbai.
   In this case, PG course as per University of Mumbai syllabus is of 4 credits. Thus additional work needs to be done for remaining 2 credits. (Any relevant PG course suggested by guide 4 credits + additional work suggested by guide for 2 credits).

   Additional work may be in line with any of the following guidelines:

   i. Minimum four assignment problemsfrom same domain area

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OR

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   ii. Any relevant PG Laboratory course, as per University of Mumbai PG syllabus, suggested by guide

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OR

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   iii. One course project from same domain area

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OR

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   iv. One simulation based project in the domain area using relevant software tool.

Course Code	Course Name	Credits
PhdS103	**Seminar**	**04**

Following guidelines for credit seminar shall be followed:

1. Seminar should be based on thrust areas in specific research domain.
2. Research scholar should do literature survey, identify the topic for seminar and finalize the same in consultation with Guide/Supervisor.
3. Research scholar is expected to use multiple literatures and understand the topic.
4. Report should be compiled in the standard format as per University Guidelines for report writing and present in front of pair of Examiners appointed by the Head of the Department/Institute of respective Program.

Seminar should be assessed jointly by the pair of Internal and External Examiners

Following points must be assessed during the presentation of Credit Seminar
   i.   Quality of Literature survey and Novelty in the topic
  ii.   Relevance to the specialization
 iii.   Understanding of the topic
 iv.   Quality of Written and Oral Presentation