Semester: III
Core Course

10. Course Code & Title: MPC 53 01 & Data Analytics in Health Sciences

Credit - 3

Course objective:

The objective of this course is to enable research students understand the basics of both quantitative and qualitative analytics in health sciences using different techniques and tools of data analyses.

Course outcomes:

On completion of this course, students will be able to:

1. Learn the basics of data sciences, big data, predictive analytics and regression.
2. Perform analysis of numerical and textual data using R and Nvivo-12 software respectively.
3. Learn approaches to qualitative data analysis such as framework and thematic analysis, content analysis and socio-linguistic approaches.
4. Perform coding, developing patterns, categories and themes from textual data collected as a result of in-depth interviews, key informants' interviews, or focus group discussion.

Skills developed:

On successful completion of the course the students will be skilled in conducting quantitative and qualitative data analysis using R and NVivo.

Teaching methods: This course will be delivered using a variety of methods and modalities such as classroom and online lectures, self-study, seminar presentations, group work and hands-on training with both R and NVivo software.

Units and Topics	Teaching Methods								Mandatory Readings
Unit-I: Review of basic concepts in Epidemiology and Bio-statistics									
	L	FW	FV	CS	GW	SS	SP	P	
1.1 Review of basic concepts in epidemiology and descriptive and inferential statistics					X	X	X		Arag ´on T J. Applied Epidemiology using R. University of California, Berkeley School of Public Health, and the San Francisco Department of Public Health; 2013.
Unit-II: Introduction to R-software and getting data into R Studio									
2.1 Installing R and R Studio 2.2 R console and Command Prompt 2.3 Introduction to Packages in R and installation 2.4 Importing data into R 2.5 Viewing data in R 2.6 Modifying variables in a Data set - Modifying variables in a data set, merging data, sorting data, recoding and renaming of variables	X					X		X	Arag ´on T J. Applied Epidemiology using R. University of California, Berkeley School of Public Health, and the San Francisco Department of Public Health; 2013. Kamath A, Meleth A, Sathiakumar N. R Manual for Health Science Researchers. Manipal University Press; 2012.
Unit-III: Data Analysis using R									

Content	1	2	3	4	5	6	7	References
3.1 Univariate analysis: Mean, median, frequency 3.2 Data visualization - histogram, box plot, bar diagram, scatter plot 3.3 Bivariate analysis: t-test, chi-square test, 3.4 Introduction to multivariate analysis using R – ANOVA, linear and logistic regression	X					X	X	Arag´on T J. Applied Epidemiology using R. University of California, Berkeley School of Public Health, and the San Francisco Department of Public Health; 2013. Kamath A, Meleth A, Sathiakumar N. R Manual for Health Science Researchers. Manipal University Press; 2012.
Unit-IV: Introduction to data science and Big data in health research								
4.1 Definition and scope of data science in health science research 4.2 Introduction to big data and sources of big data in health sciences 4.3 Introduction to algorithms in big data analytics 4.4 Application of predictive and prescriptive analysis in health sector	X					X		Stanton. J (2012). Introduction to Data Science. Syracuse University. Das, S, R., & Das, S. (2016). Data science: theories, models, algorithms, and analytics. *Learning*, *143*, 145.
Unit-V: Understanding textual data and its analyses								

Content									References
5.1 Concepts and sources of qualitative data in health sciences 5.2 Data formats such as texts, diagram, symbols and artifacts. 5.3 Approaches to qualitative data analyses: Quasi-statistical approach (Content analysis), Thematic and framework approaches, Interpretative approach (interpretative phenomenological analysis and grounded, theory), and Sociolinguistic approaches (discourse analysis and conversation analysis)	X						X		Lacity, M. C., & Janson, M. A. (1994). Understanding qualitative data: A framework of text analysis methods. *Journal of Management Information Systems*, *11*(2), 137-155. Ulin, P. R., Robinson, E. T., & Tolley, E. E. (2005). Qualitative methods in public health. *Med Sci Sports Exercise*, *37*(7), 1249. Noble, H., & Smith, J. (2014). Qualitative data analysis: a practical example. Evidence-based nursing, 17(1), 2-3. Braun, V., Clarke, V., & Terry, G. (2014). Thematic analysis. Qualitative Res Clinical Health Psychological, 24, 95-114
Unit-VI: Hands-on training with Nvivo-12									
6.1 Understand type(s) of data collected its unit of analysis, coding approach, types of codes, and choice of analytic method. 6.2 Set up an NVivo project and organize textual data. 6.3 Code data manually as well as using Nvivo software.	X							X	Saldaña, J., & Omasta, M. (2016). Qualitative research: Analyzing life. Sage Publications. Bazeley, P., & Jackson, K. (Eds.). (2013). Qualitative data analysis with NVivo. Sage Publications Limited. Wong, L. P. (2008). Data analysis in qualitative research: A brief guide to using NVivo. Malaysian family

6.4 Develop patterns, identify relationships across data and generating categories, themes and sub-themes. 6.5 Present findings using graphic displays and visualization methods.								physician: the official journal of the Academy of Family Physicians of Malaysia, 3(1), 14.

L- Lecture; FW- Field work; FV - Field Visit; CS - Case study; GW- Group work; SS- Self-study; SP- Seminar presentation; P-Practical

Evaluation

As per CBCS guidelines, this course will be evaluated for 100 marks with a Continuous Evaluation (CA) component of 40 marks and End-Semester Evaluation (ESA) component of 60 marks.

Additional readings:

1. Zamawe, F. C. (2015). The implication of using NVivo software in qualitative data analysis: Evidence-based reflections. Malawi Medical Journal, 27(1), 13-15.
2. Welsh, E. (2002). Dealing with data: Using NVivo in the qualitative data analysis process. In Forum qualitative social forum: qualitative social research (Vol. 3, No. 2).
3. Richards, L. (1999). Data alive! The thinking behind NVivo. Qualitative health research, 9(3), 412-428.
4. Richards, L. (1999). Using NVivo in qualitative research. Sage.
5. Ryan, G. W., & Bernard, H. R. (2000). Techniques to identify themes in qualitative data. Handbook of Qualitative Research. 2nd ed. Thousand Oaks, CA: Sage Publications.
6. Bazeley, P. (2009). Analysing qualitative data: More than 'identifying themes'. Malaysian Journal of Qualitative Research, 2(2), 6-22.