Foundation of Healthcare Technologies Society
321, 322, 323 Somdutt Chamber-2, Bhikaji Cama Place, New Delhi-110066 Phone 91- 8527897771 Website: fhts.ac.in
Registration No.: *S/877/SDM/NW/2012*

FHTS

Parul Institute of Public Health, Parul University
P.O.Limda, Ta.Waghodia – 391760
Dist. Vadodara, Gujarat (India)
info@paruluniversity.ac.in
+91-2668-260300

Certificate Course in Operational Research in Population Health (CER-ORPH)

Course Curriculum and Syllabus

A Joint Collaboration
of

Foundation of Healthcare Technologies Society, New Delhi, India

&

Parul Institute of Public Health, Parul University, Gujarat, India

Index

Course Curriculum and Syllabus

Overview of Operational Research

Defining Operational Research

Operational Research is an interdisciplinary branch that uses systematic research techniques for decision-making to achieve specific outcomes. It aids in the design of interventions, strategies, and coverage of programs and the development of tools to improve quality and effectiveness.

Why the need for operational research?

There is an urgent need to develop a trained workforce proficient in Operations research planning, implementation, and evaluation. Participants will synthesize and apply the knowledge acquired from the course to address global and national public health issues.

About the Program

What does the program offer?

Certificate in Operational Research in Public Health (CER-ORPH) is a program covering facets of operational research. It provides the opportunity to students to gain insights on various aspects of systematic research techniques. The course objective is to develop skills of the learners to design and strategize the interventions in order to enhance the quality and effectiveness of a program.

The course aims to develop a trained workforce in Operations research planning, implementation, and evaluation. The program aids students in synthesizing and applying the acquired knowledge from the course to address global, national and public health issues.

The program has a dynamic approach to teaching by using various modes of teaching that are Lecture series, providing suggested latest reading material and in-class discussion along with continuous evaluation methods with an aim to build skills amongst the students. Additionally, the program offers a platform to students to voice their opinions on v-Inspire Public Health Discussion Board along with hands-on research experience.

Program Duration: 6 Months (4 months of training and 2 months of experiential learning)

Course Delivery: Online

Who Can Attend?

- Any undergraduate/graduate/postgraduate/PhD
- Development or Health professionals working in health research
- Newly joined faculties in a public health discipline

Unique Features of the Course

- Flexible, self-paced
- Asynchronous and synchronous learning
- Weekly interactive lectures
- Case studies
- Weekly discussions
- Problem-solving exercises
- Research project

- Mentorship and Experiential Learning
- Discussion Forum

Learning Objectives

The students will learn:

- To translate ideas into research questions.
- To apply theoretical knowledge in community settings.
- To identify gaps in existing research/solutions
- To analyze and interpret quantitative and qualitative data.
- To interpret data and disseminate the research findings
- To design and develop a research study

Skills Student Acquire

- Translate ideas into research questions
- Identify gaps in existing research/solutions
- Gather community needs before planning a solution
- Acquire skills in quantitative and qualitative research
- Data interpretation and results writing
- Making data meaningful
- Role of technology as an enabler to enhance population health outcomes

Program Benefits

- Turn ideas into executable action
- Get involved in funded research projects to gain real world research experience
- Demonstrate research experience to better qualify for higher education
- Opportunity to present research in International peer reviewed journal
- Opportunity to present the research findings in high quality conferences that will bring visibility

Program Features

- Synchronous and Asynchronous learning
- Weekly interactive lectures
- Weekly discussions
- Problem solving exercises
- Case studies
- Research Seminar
- Experiential learning
- Research advisor assigned

Course Layout

Week-wise Course Layout	
Week 1	Research Domains
Week 2	Basics of Research Methodology
Week 3	Formulating a Research Question
Week 4	Study Methods
Week 5	Critical appraisal of scientific literature
Week 6	Research Design
Week 7	Defining Research Hypothesis
Week 8	Survey Methods
Week 9	Sampling Methods
Week 10	Data Analysis 1
Week 11	Scoping Review
Week 12	Manuscript Writing
Week 13	Data Analysis 2
Week 14	Focus group interviews and Qualitative data
Week 15 – Week 16	Research Seminar
Week 17	Case study
Week 18-25	Experiential learning

Course Syllabus & Structure

Module No.	Topic	Teaching and Activity	Assessment Type
Module 1	Research Domains	Lecture, Reading, and Class Discussion	Quiz
Module 2	Basics of Research Methodology	Lecture, Reading, and Class Discussion	Quiz
Module 3	Formulating a Research Question	Lecture, Reading and Class Discussion	Quiz
Module 4	Study Methods	Lecture, Reading and Class Discussion	Quiz
Module 5	Critical appraisal of scientific literature	Lecture, Reading and Class Discussion	Quiz
Module 6	Research Design	Lecture, Reading and Class Discussion	Assignment
Module 7	Defining Research Hypothesis	Lecture, Reading, and Class Discussion	Assignment
Module 8	Survey Methods	Lecture, Reading, and Class Discussion	Quiz
Module 9	Sampling Methods	Lecture, Reading, and Class Discussion	Assignment
Module 10	Data Analysis 1	Lecture, Reading, and Class Discussion	Assignment
Module 11	Scoping Review	Lecture, Reading and Class Discussion	Assignment
Mid-Evaluation			
Module 12	Manuscript writing	Lecture, Reading and Class Discussion	Assignment
Module 13	Data analysis 2	Lecture, Reading and Class Discussion	Assignment
Module 14	Focus group interviews and Qualitative data	Lecture, Reading and Class Discussion	Quiz
	Research Seminar	Class Presentation	-
	Case study	Class Presentation	-
Experiential learning: Hands-on research experience			
Final-Evaluation			

Note: Certificate will be provided to candidates who successfully complete the course.

Skills the program offers to the students

The program shapes understanding and provide opportunities to the students to acquire dynamic skills by building their abilities to:

- Identify research gap
- Formulate a research study design
- Critical thinking in designing research methodology
- Implementation of a research study
- Assess and understand quantitative and qualitative data
- Interpretation of data

Benefits of the Course

After completion of this course the students would be able to:

- Turn ideas into executable research
- Learn essential research skills by practice
- Ability to involve in funded research projects to gain experience
- Opportunity to be mentored by National and International experts
- Gain research experience to qualify for higher education
- Opportunity to publish research paper

Course Curriculum

Module No.	Topic	Learning Objectives
Module 1	Research Domains	1. To learn the concept of operational research, implementation research and Health system research 2. To integrate different research domain for improving population health 3. To compare the different research domain in different settings
Module 2	Basics of Research Methodology	1. To categorize the different research areas 2. To describe the research methodology 3. To identify various steps involved in research
Module 3	Formulating a Research Question	1. To understand the process of formulating a research question 2. To know the FINER criteria to develop a research question 3. To identify different components of research questions
Module 4	Study Methods	1. To analyze the research problem 2. To implement the study design 3. To apply the appropriate study tool
Module 5	Critical appraisal of scientific literature	1. To learn different databases for conducting literature review 2. To compare different types of literature reviews 3. To identify strength and weaknesses of research articles
Module 6	Research Design	1. To understand the characteristics of mixed method research 2. To design and develop research study

		3. Recognize the ethical considerations of research designs
Module 7	Defining Research Hypothesis	1. To understand null and alternate hypothesis 2. To develop a research hypothesis 4. Identify the steps involved in hypothesis testing
Module 8	Survey Methods	1. To describe the methods required to design a survey 2. To describe characteristics of survey methodology 3. To frame different types of survey methods
Module 9	Sampling Methods	1. To understand different sampling methods 2. To distinguish between different sampling methods 4. To apply sampling methods relevant to research objectives
Module 10	Data Analysis 1	1. To understand the significance of the data 2. To learn about types of data involved in healthcare research 3. To learn about steps involved in data preparation
Module 11	Systematic and Scoping Review	1. To learn and understand the basics of scoping reviews 2. Describe the steps to follow when doing a scoping review 3. Discuss a scoping review case study
Module 12	Guide to scientific writing	1. To know the key elements of a research paper 2. To recognize the structure of key elements involved in scientific writing 3. To learn about reporting guidelines for study types

Module 13	Data analysis 2	1. To understand steps and methods involved in data analysis 2. To train students in presentation and interpretation of data 3. To learn about future scope of healthcare data management
Module 14	Focus group interviews and Qualitative data	1. To Investigate the concerns and perspectives on a specific health issue among the population. 2. To describe the influencing causes of health-related behavior 3. To analyze the qualitative data in health domain
	Research Seminar	Students will gain hands-on experience and instruction that will help them improve their communication and presenting abilities.
	Case study	Students will develop the abilities necessary for comprehending, interpreting, and summarizing the provided case, which will help them with critical thinking, problem solving, and decision-making.

Experiential Learning

Our experiential learning component includes our **V**irtual **I**nteractive **N**ovel **S**upport **P**rogram for **I**nnovation, **R**esearch and **E**ntrepreneurship aims to address population health challenges of the 21st century by enhancing academic and non-academic skills of students using an Innovative and participatory experiential learning experience.

Course Quadrants:

- **Quadrant I E-tutorial Topics**
- **Quadrant II- Weekly Reading Material** (Case studies, and Research paper readings)
- **Quadrant III- Discussion Forum (**Weekly discussion topics to facilitate knowledge exchange)
- **Quadrant IV-Assessments**

S.No.	Assessment Type	Weightage
1.	Quiz	20%
2.	Weekly Assignments	10%
3.	Case Studies	10%
4.	Presentations	5%
5.	Mid-term Evaluation	25%
6.	End-term Evaluation	30%
	Total	**100%**

Program Outcome

- Certificates are provided to candidates who successfully complete the course.
- Opportunity to participate in Career and mentorship program (CAMP)
- Opportunity to participate in SMAART IMPACT
- Voluntarily participation in Community initiatives

Contact Details

- **Course Coordinator:** Mansi Gupta, Community Initiative Coordinator, Foundation of Healthcare Technologies Society (FHTS), New Delhi
- **Contact number** – 8527897771
- **Email** – admissions@fhts.ac.in, academic@fhts.ac.in
- **Website**- https://fhts.ac.in/
- **Address**- 321, 322, 323 Somdutt Chamber-2, Bhikaji cama place, New Delhi 110066

Foundation of Healthcare Technologies Society
321, 322, 323 Somdutt Chamber-2, Bhikaji Cama Place, New Delhi-110066 Phone 91- 8527897771 Website: fhts.ac.in
Registration No.: *S/877/SDM/NW/2012*

FHTS

Parul Institute of Public Health, Parul University
P.O.Limda, Ta.Waghodia – 391760
Dist. Vadodara, Gujarat (India)
info@paruluniversity.ac.in
+91-2668-260300

CER-ORPH
Detailed Curriculum

Module 1
Research Domain

Class Duration: 60 minutes

Module Description

This module will give an overview of the three research domains i.e. operational research, implementation research, and health systems research, their characteristics, importance, differences, similarities and type of research questions they address. It highlights the need for evidence-based research to strengthen health systems.

Learning Objectives

- To understand the concept of operational research, implementation research, and Health system research.
- To integrate different research domains for improving population health.
- To comprehend the use of research domains in different population health settings.

Learning Outcomes

Upon completing this module students will be able to:

- Have an overview of the operational research, implementation research, and Health system research.
- Understand the interaction of different research domains and how to integrate them effectively for a greater impact on the overall research effort.

- Apply research in their respective domains

Contents:

- Need for Research
- Research Domains
- Operational Research
- Implementation Research
- Health system research
- Overlap of three domains

Suggested Readings:

- Silal SP. Operational research: A multidisciplinary approach for the management of infectious disease in a global context. European journal of operational research. 2021 Jun 16;291(3):929-34.
- Sin, J. (2020). Public Health: Three Key Domains. https://doi.org/10.1093/oso/9780198840732.003.0005, C5–C5.P68
    -
- Goel S. (2022). Developing an operational research model for strengthening policy and programs on prevention and control of hypertension in India. Journal of family medicine and primary care, 11(9), 5722–5729. https://doi.org/10.4103/jfmpc.jfmpc_524_22
- Hou, Y. Y., Zhu, B. B., & Tao, F. B. (2023). Zhonghua yu fang yi xue za zhi [Chinese journal of preventive medicine], 57(3), 438–442. https://doi.org/10.3760/cma.j.cn112150-20220505-00441
- Farrand, E., Collard, H. R., Guarnieri, M., Minowada, G., Block, L., Lee, M., & Iribarren, C. (2023). Extracting patient-level data from the electronic health record: Expanding opportunities for health system research. PloS one, 18(3), e0280342. https://doi.org/10.1371/journal.pone.0280342
- Carter, M. W., & Busby, C. R. (2022). How can operational research make a real difference in healthcare? Challenges of implementation. European Journal of Operational Research. https://doi.org/10.1016/j.ejor.2022.04.022
- Gustavson, A. M., Hagedorn, H. J., Jesser, L. E., Kenny, M. E., Clothier, B. A., Bounthavong, M., Ackland, P. E., Gordon, A. J., & Harris, A. H. S. (2022). Healthcare quality measures in implementation research: advantages, risks and lessons learned. Health Research Policy and Systems, 20(1). https://doi.org/10.1186/s12961-022-00934-y

Module 2

Basics of Research Methodology

Class Duration: 60 minutes

Module Description

The module on research methodology introduces students to the essential aspects of conducting research in various fields. It emphasizes the dynamic nature of research, linking the past with the present and future, and its role in generating well-informed knowledge through critical analysis. The module covers characteristics of research, including the use of scientific methods, objectivity, and empirical nature. It explores different categories of research, such as empirical and theoretical research, basic and applied research, and quantitative and qualitative research. Students will learn about the steps involved in the research process. Overall, the module provides a comprehensive understanding of research methodology and its impact on advancing knowledge across diverse domains.

Learning objectives:

•To formulate a logical thesis that expresses a perspective on their research subject.

•The source of data in order to prove the depth, extent and validity of research.

•To identify various steps involved in research

•Practice their research skills, this includes evaluating their sources, summarizing significant information, and properly citing their sources.

Learning outcomes:

Upon completion of this module students will be able to:

•To define the key elements of different categories of research.

•Identify the type of research required according to the research questions.

•To compare basic concepts employed in qualitative and quantitative research.

Module content:

- Introduction
- What is research?
- Research methodology
- Types of research in research methodology
- Qualitative research definition, methods, advantages, disadvantages
- Quantitative research definition, methods, advantages, disadvantage
- Empirical and Theoretical research
- Basic and Applied research
- Health research triangle
- Research process framework
- References

Suggested Reading Material

1. Health research methodology: A guide for training in research methods. 2nd ed. (n.d.). https://apps.who.int/iris/handle/10665/206929

2. Mehta, S. (2022, August 25). Types of research methodology. The Voice of Education Industry. https://eduvoice.in/types-research-methodology/

3. Shanti Bhushan et al., 2019. Handbook of research methodology. https://www.google.co.in/books/edition/Handbook_of_Research_Methodology/O54wDwAAQBAJ?hl=en&gbpv=1&dq=research+methodology&printsec=frontcover

4.9781545703403. (n.d.). Handbook of Research Methodology: A Compendium for Scholars & Researchers. In *Google Books*. Educreation Publishing. Retrieved September 2, 2023, from https://www.google.co.in/books/edition/Handbook_of_Research_Methodology/O54wDwAAQBAJ?hl=en&gbpv=1&dq=research+methodology&printsec=frontcover

5. Research methods for business students, 5/E. (n.d.). Google Books. https://www.google.co.in/books/edition/Research_Methods_For_Business_Students_5/dDGPPd_4y5sC?hl=en&gbpv=1&dq=research+methods+saunders&printsec=frontcover

6. Research: Definition, characteristics, goals, approaches. (2023, May 23). https://www.iedunote.com/research-definition-characteristics-goals-approaches#2-characteristics-of-research

7. Jansen, D. (2022, June 27). What is research methodology? Definition + examples. Grad Coach. https://gradcoach.com/what-is-research-methodology/

Module 3

Formulating Research Question

Class Duration: 60 Minutes

Module Description

The course is aimed to provide graduate students with the essential skills and knowledge that is required to formulate a tangible research question. It will include a methodological approach on how to formulate a research question, identify characteristics and components of a good research question. The students will also learn the constituents of literature search and sources of literature. The course will help the students to formulate a research hypothesis and an appropriate research question that can help with the scientific investigation.

Learning Objectives

- To understand the process of formulating a research question.
- To know the FINER criteria to develop a research question.
- To identify the characteristics of a good research question.
- To learn about literature, search for identifying a good research question.
- To define components of a research question.

Learning Outcomes

Upon completion of this module students will be able to:

- Identify and select a suitable research topic.
- Develop and write the research question, research hypotheses, and research objectives.
- Recognize the significance of a good research question in scientific research.
- Evaluate the research question as per a set of criteria.

Content

- FINER criteria for research question
- Characteristics of a good research question
- Literature search – constituents and description
- Sources of literature - published literature, grey literature
- Components of research question using PICOT
- Examples of research question

Reading Material

- Dhir, S.K., Gupta, P. (2021). Formulation of Research Question and Composing Study Outcomes and Objectives. Indian Pediatr. 58, 584–588. https://doi.org/10.1007/s13312-021-2246-y
- Ratan, S. K., Anand, T., & Ratan, J. (2019). Formulation of Research Question - Stepwise Approach. Journal of Indian Association of Pediatric Surgeons, 24(1), 15–20. https://doi.org/10.4103/jiaps.JIAPS_76_18
- Fandino W. (2019). Formulating a good research question: Pearls and pitfalls. Indian journal of anaesthesia, 63(8), 611–616. https://doi.org/10.4103/ija.IJA_198_19
- Coeli, C. M., Carvalho, M. S., & Lima, L. D. de. (2021). The importance of the research question in the analysis of epidemiological data. In *Cadernos de saude publica* (Vol. 37, Issue 5, p. e00091921). https://doi.org/10.1590/0102-311X00091921
- Lira, R. P. C., & Rocha, E. M. (2019). PICOT: Imprescriptible items in a clinical research question. In *Arquivos brasileiros de oftalmologia* (Vol. 82, Issue 2, p. 1). https://doi.org/10.5935/0004-2749.20190028

Module 4

Study Methods

Class Duration: 60 minutes

Module Description-
This module will help students learn about the scope and objectives of conducting surveys and their methods of administration. The students will gain an understanding of stages of survey and tools administered for collecting data in healthcare research.

Learning Objectives-

- To define Survey methodology
- To describe purpose of survey methodology
- To identify stages of survey methodology
- To classify survey methods.
- To learn the skills for Designing effective questionnaire
- To discuss Sampling Techniques.

Learning Outcomes -
Upon completion of this module the students will be able to

- Discuss survey methodology.
- Explain the importance of sequencing questions logically and anticipating follow-up questions.
- To describe various sampling techniques.
- To Analyze population-related challenges.
- To Identify emerging trends, such as electronic surveys.

Content-

- Study Method
- Introduction to Survey
- Classification
- Stages of Survey
- Data collection Tools
- Survey Method selection

Suggested Reading -

1. Toy, S., & Guris, R. J. D. (2022). How to conduct survey-based research. *Anaesthesia*. https://doi.org/10.1111/anae.15943
2. Shang, Z. (2023). Use of Delphi in health sciences research: A narrative review. *Medicine, 102*(7), e32829. https://doi.org/10.1097/md.0000000000032829
3. Oates, M., Crichton, K., Cranor, L. F., Budwig, S., Weston, E. J. L., Bernagozzi, B. M., & Pagaduan, J. (2022). Audio, video, chat, email, or survey: How much does online interview mode matter? *PLOS ONE*, *17*(2), e0263876. https://doi.org/10.1371/journal.pone.0263876
4. Sharma, H. (2022). How short or long should be a questionnaire for any research? Researchers dilemma in deciding the appropriate questionnaire length. *Saudi Journal of Anaesthesia*, *16*(1), 65. https://doi.org/10.4103/sja.sja_163_21

Module 5

Critical Appraisal of Scientific Literature

Class Duration: 60 minutes

Module Description:

Critical appraisal of scientific literature is a systematic and analytical process used to assess the validity, reliability, relevance, and applicability of research studies. This practice is crucial for ensuring that evidence-based decisions are made in various fields, including medicine, psychology, environmental science, and more. By critically appraising scientific literature, researchers, clinicians, and professionals can confidently determine the quality of studies, draw accurate conclusions, and make informed decisions. This module briefly outlines the overview of critical appraisal of scientific literature, it's importance, components, strengths and weaknesses of scientific literature. It also elaborates the different databases and the tools used for the critical appraisal of scientific literature.

Learning objectives:

- To understand the term 'Critical Appraisal of Scientific Literature'
- To explore the importance of critical appraisal
- To know the components of scientific literature
- To identify strengths and weaknesses of critical appraisal of scientific literature
- To learn different databases for conducting a literature review
- To become familiar with the tools used for critical appraisal of scientific literature

Learning outcomes:

Upon completion of this module students will be able to:

- Define 'Critical Appraisal of Scientific Literature'
- Understand the importance of critical appraisal
- Know the components of scientific literature

- Identify the strengths and weaknesses of scientific literature
- Conduct literature review using different databases
- Learn about the literature appraisal tools

Content:

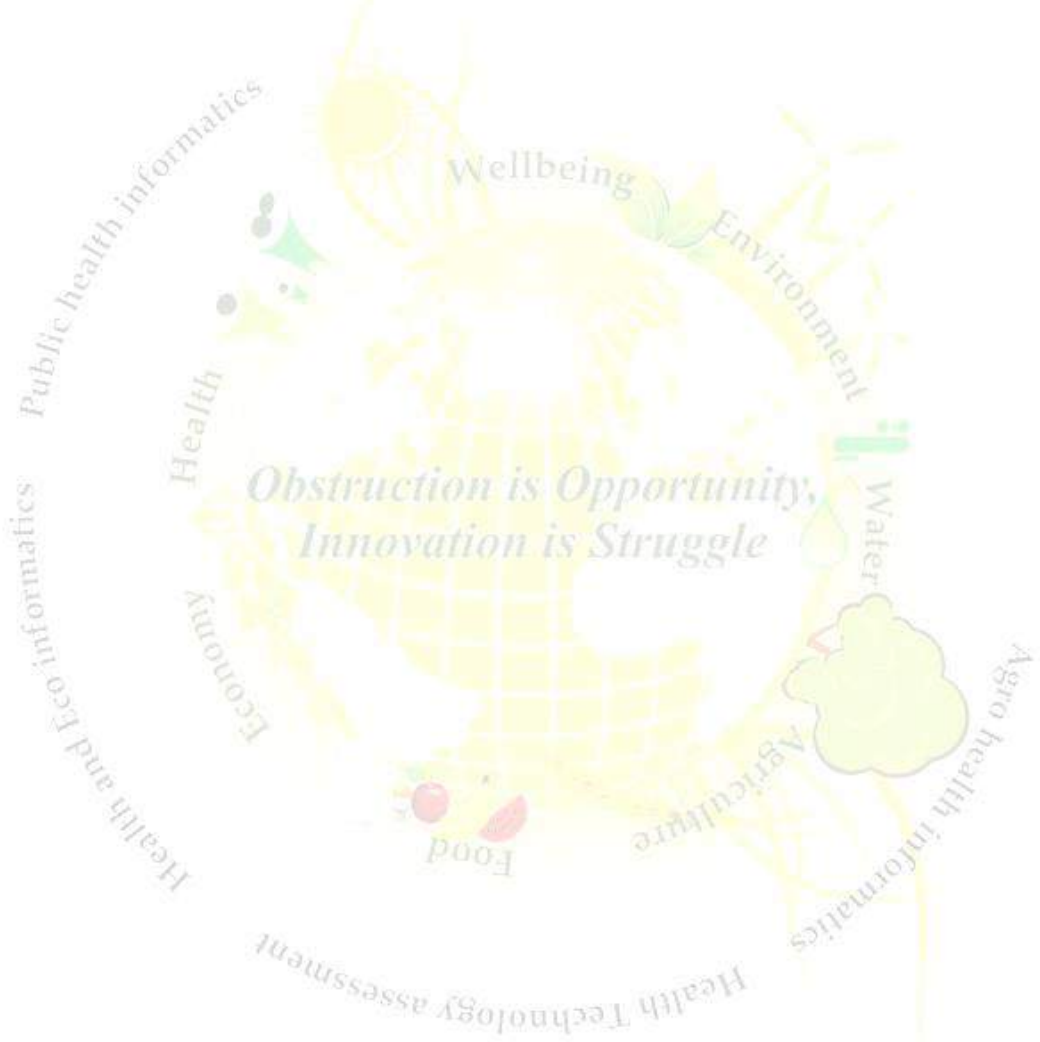
- Introduction
- Importance of critical appraisal of scientific literature
- Components of critical appraisal of scientific literature
- General structure of a manuscript
- Strengths and weaknesses of scientific literature
- How to appraise a scientific literature
- Databases for critical appraisal of scientific literature
- Tools for critical appraisal of scientific literature
- References

Suggested Reading Material:

- Manjali, Jifmi Jose; Gupta, Tejpal. Critical appraisal of a clinical research paper: What one needs to know. Cancer Research, Statistics, and Treatment 3(3):p 545-551,Jul–Sep2020.DOI:10.4103/CRST.CRST_211_20 https://journals.lww.com/crst/Fulltext/2020/03030/Critical_appraisal_of_a_clinical_research_paper_.21.aspx
- Morrison,K.(2017,Dec 08).Dissecting the literature: The importance of Critical Appraisal. Retrieved from https://www.rcseng.ac.uk/library-and-publications/library/blog/dissecting-the-literature-the-importance-of-critical-appraisal/
- Knowledge synthesis: systematic & scoping reviews, and other review types. (2021). Retrieved from University of Toronto Libraries: https://guides.library.utoronto.ca/c.php?g=713309&p=5121959
- Li, L., Asemota, I., Liu, B. et al. AMSTAR 2 appraisal of systematic reviews and meta-analyses in the field of heart failure from high-impact journals. Syst Rev 11, 147 (2022).

https://doi.org/10.1186/s13643-022-02029-9

- Checklist for systematic reviews and research synthesis. (2020). Retrieved from jbi.global: https://jbi.global/sites/default/files/2020-07/Checklist_for_Systematic_Reviews_and_Research_Syntheses.pdf
- Cuschieri S. (2019). The STROBE guidelines. Saudi journal of anaesthesia, 13(Suppl 1), S31–S34. https://doi.org/10.4103/sja.SJA_543_18



Module 6

Research Designs

Class Duration: 60 minutes

Module Description

The module is designed to understand research, followed by a discussion of the different types of research designs. The ideas and procedures of study design specific to the field of public health will be thoroughly understood by students. Learn about cross-sectional, case-control, and cohort designs—quantitative research techniques frequently used in public health studies. To build a research proposal, students can use the knowledge they have received to formulate research questions, choose an appropriate design, and lay out a strategy for gathering and analyzing data.

Learning Objectives:

- Identify different research designs
- Evaluate the strengths and limitations of each research design.
- Apply appropriate research designs to real-world scenarios in public health and medicine.
- Understand how to combine multiple research designs for comprehensive investigations.

Learning Outcomes:

Upon completion of this module, students will be able to:

- Able to understand and apply their understanding and research skills acquired in this module to research assignments they would take up in their internship and dissertation
- Acquire the knowledge and skill to independently conceptualize and develop robust study designs around specific research themes

Content:

1. Introduction to Research Design
2. Experimental Designs
3. Observational Designs

4. Qualitative Research Designs
5. Choosing the Right Design
6. Real-world Examples

Suggested Reading Materials:

1. Castelnovo, P., Clò, S., & Florio, M. (2023). A quasi-experimental design to assess the innovative impact of public procurement: An application to the Italian space industry. Technovation, 121, 102683. https://doi.org/10.1016/j.technovation.2022.102683
2. Tomaszewski, L. E., Zarestky, J., & Gonzalez, E. (2020). Planning Qualitative Research: Design and Decision Making for New Researchers. International Journal of Qualitative Methods, 19(1), 1–7. sagepub. https://doi.org/10.1177/1609406920967174
3. Shine, S., Tamirie, M., Kumie, A. et al. Pregnant women's perception on the health effects of household air pollution in Rural Butajira, Ethiopia: a phenomenological qualitative study. BMC Public Health 23, 1636 (2023). https://doi.org/10.1186/s12889-023-16578-8
4. Gu, W., Yan, D., Yuan, Z. et al. (2023). Knowledge, attitudes, and practice towards allergic rhinitis in patients with allergic rhinitis: a cross-sectional study. BMC Public Health 23, 1633. https://doi.org/10.1186/s12889-023-16607-6
5. Muzari, T., Goerge, N., & Shonhiwa, S. (2022). Indiana Journal of Humanities and Social Sciences Qualitative Research Paradigm, a Key Research Design for Educational Researchers, Processes and Procedures: A Theoretical Overview of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0). https://indianapublications.com/articles/IJHSS_3(1)_14-20_61f38990115064.95135470.pdf

Module 7

Defining Research Hypothesis

Class Duration: 60 Minutes

Module Description

This module gives an overview of the Research hypothesis, its importance, process involved in framing hypothesis, characteristics of hypothesis and its variables. It explains the different types of variables in research and also explains types of Hypotheses with adequate examples. It will also give a brief about the strong theory base, symbols and statements involved in hypothesis and its significance in research methods.

Learning Objectives

- To understand basics of research hypothesis
- To differentiate dependent and independent various
- To learn about process involved in framing hypothesis

Learning Outcomes

Upon completion of this module students will be able to:

- Frame hypothesis for different research methods
- To define confounding and ways to avoid them
- To compare various symbols and statements in hypothesis
- Able to differentiate between null and alternate hypothesis

Contents:

- Research process
- Definition of research hypothesis
- Characteristics of good hypothesis
- Types of variables
- Confounding
- Systemic relationship
- Strong theory base
- Hypothesis wording
- Types of hypotheses
- Fate of hypothesis
- Few examples on hypothesis

Suggested Readings:

1. Liu, Z., Shen, J., Barfield, R., Schwartz, J., Baccarelli, A. A., & Lin, X. (2022). Large-scale hypothesis testing for causal mediation effects with applications in genome-wide epigenetic studies. *Journal of the American Statistical Association*, *117*(537), 67-81.
2. Willis, L. D. (2023). Formulating the research question and framing the hypothesis. *Respiratory Care*.
3. Keeler, C., & Curtis, A. C. (2023). Introduction to Statistical Hypothesis Testing in Nursing Research. *AJN The American Journal of Nursing*, *123*(7), 53-55.
4. Smit, E. G., Meijers, M. H., & Ischen, C. (2023). Doing it Together: Testing the Impersonal Impact Hypothesis in the Public Health Domain. *European Journal of Health Communication*, *4*(3), 1-18.
5. Nayak, J. K., & Singh, P. (2021). *Fundamentals of research methodology problems and prospects*. SSDN Publishers & Distributors.
6. Mishra, S. B., & Alok, S. (2022). Handbook of research methodology.
7. Casula, M., Rangarajan, N., & Shields, P. (2021). The potential of working hypotheses for deductive exploratory research. *Quality & Quantity*, *55*(5), 1703-1725.

Module 8

Survey Methods

Class Duration: 60 minutes

Module Description

This module explores the fundamental concepts of survey research as a powerful tool for gathering information and making informed decisions. It covers different types of surveys, including descriptive and cross-sectional research, highlighting their applications and limitations. The module delves into the various methods of data collection within surveys, such as health interview, health examination, and health records surveys, outlining their advantages and disadvantages. It emphasizes the importance of questionnaire design, language precision, and sequencing of questions for reliable results. Additionally, the module discusses the essential auxiliary activities, like pretesting, interviewer training, and data editing, that contribute to successful survey execution and data quality.

Learning Objectives

- To describe the methods required to design a survey.
- To describe characteristics of survey methodology.

Learning Outcomes

Upon completion of this module, we will be able to:

- Understand the basic terminologies associated with the survey methods.
- Learn about surveys and different types of surveys.
- Choose appropriate survey methods and evaluate it.
- Understand the limitations of different survey methods
- Learn about the different types of biases.

Contents:

- Definition of Survey
- Types of Survey
- Uses of Survey
- Different Survey Methods – Advantages, Disadvantages & Execution
- Steps in Surveying
- Conclusion

Suggested Readings/ Resources/ References:

1. Bhandari, P. (2023). Questionnaire Design | Methods, question types & examples. *Scribbr*. https://www.scribbr.com/methodology/questionnaire/
2. Khan, A. (2022). *Questionnaire design*. Pressbooks. https://westernsydney.pressbooks.pub/customerinsights/chapter/chapter-10-questionnaire-design/#:~:text=Sequencing,one%20question%20to%20the%20next.
3. Da Cunha De Sá-Caputo, D., Sonza, A., Bachur, J. A., & Bernardo-Filho, M. (2020). Development, validation and reliabilty of a questionnaire to evaluate the changes on the level of physical exercises and in daily life habits due to COVID-19 pandemic social distancing. *Acta Bio-medica : Atenei Parmensis*, *91*(3). https://doi.org/10.23750/abm.v91i3.9888
4. Hu, S. (2014). Pretesting. In *Springer eBooks* (pp. 5048–5052). https://doi.org/10.1007/978-94-007-0753-5_2256
5. *Qualtrics*. (n.d.). https://www.qualtrics.com/support/survey-platform/survey-module/survey-module-overview/
6. Czaja, R., & Blair, J. (2005). *Designing surveys*. https://doi.org/10.4135/9781412983877
7. Bhandari, P. (2023a). Ethical Considerations in Research | Types & Examples. *Scribbr*. https://www.scribbr.com/methodology/research-ethics/

Module 9

SAMPLING METHODS

Class Duration: 60 minutes

Module Description:

The module on research sampling methods introduces students to select samples from the population and the essential aspects of conducting research in various fields. It emphasizes the dynamic nature of research, linking the past with the present and future, and its role in generating well-informed knowledge through critical analysis. The module covers characteristics of research, including the use of scientific methods, objectivity, and outcome. It explores different categories of research, such as quantitative and qualitative research. Students learn about primary and secondary research sources, as well as the steps involved in the sampling process. Overall, the module provides a comprehensive understanding of research methodology and its impact on advancing knowledge across diverse domains.

Learning objectives:

- To understand various sampling methods.
- To collect the desired information about the universe in less time and high degree of reliability.
- To identify various steps involved in sample recruitment.

Learning outcomes:

Upon completion of this module students will be able to:

- Identify the relation between sample, sampling, and population.
- Define the key elements in the sampling process and advantages of sampling.
- Compare basic sampling methods involved in probability and non-probability techniques.

- Select the best possible sample size for different research methods.

Content:

- Learning objectives and outcomes
- What is population, sampling, sample
- Types of sampling techniques

  Probability sampling method

  Non probability sampling method
- Recommended sample size
- References

Suggested Reading Material:

- Schillewaert, N., Langerak, F., & Duharnel, T. (2023, June). Non-Probability Sampling for WWW Surveys: A Comparison of Methods. Market Research Society. Journal., 40(4), 1–13. https://doi.org/10.1177/147078539804000403
- Berndt, A. E. (2020). Sampling methods. Journal of Human Lactation, 36(2), 224–226. https://doi.org/10.1177/0890334420906850
- Walters, W. H. (2021). Survey design, sampling, and significance testing: Key issues. Journal of Academic Librarianship, 47(3), 1–9. https://doi.org/10.1016/j.acalib.2021.102344
- Methods of sampling from a population | Health Knowledge. (n.d.). Methods of Sampling From a Population | Health Knowledge. https://www.healthknowledge.org.uk/public-health-textbook/research-methods/1a-epidemiology/methods-of-sampling-population

- Wisniowski, A. et al. Integrating Probability and Nonprobability Samples for Survey Inference. Journal of Survey Statistics and Methodology, Volume 8, Issue 1, February 2020, Pages 120–147, https://doi.org/10.1093/jssam/smz051
- Singh, A. P., Vadakedath, S., Kandi, V., Purna singh, D. A., & V. (2023, January 4). Clinical Research: A Review of Study Designs, Hypotheses, Errors, Sampling Types, Ethics, and Informed Consent. https://doi.org/10.7759/cureus.33374v

MODULE 10

DATA ANALYSIS-1

Class Duration: 60 minutes

Module Description

The purpose of this academic module on Descriptive Data analysis is to give students a thorough awareness of the descriptive method of data analysis.Students will learn what is data and its types.The method or steps of data preparation for analysis.The module discusses in detail the univariate analysis of descriptive data.Further the students can enhance their knowledge about use of future use and scope of statistical analysis of data by reading the attached links.

Learning objectives:

- To understand the significance of data analysis.
- To understand the procedures and steps involved in data preparation.
- To get an understanding of descriptive univariate analysis.
- To describe data with measures of central tendencies (mean, median, mode).
- To understand presentation and interpretation of data.

Learning outcomes:

Upon completion of this module students will be able to:

- Develop skills of Data understating.
- Demonstrate skills in data management.
- To interpret and summarize the given set of data.
- Proficiency with statistical analysis of data.
- Gaining insights about the data and applying data science concepts and methods to solve problems in community based settings.

Content:

- What is Data and variables
- Types of data in statistics.
- Characteristics of Quantitative and Qualitative data.
- Types of Variables.
- Data Collection, Editing, Missing data, Coding and data entry, Data transformation/conversion.
- Data cleaning, Non-Uniformity, Data duplicacy.
- Types of data analysis: Descriptive univariate analysis.
- Future and scope of statistical analysis of Healthcare data.
- References

Suggested Reading Material:

- Kudyba, S. (2014). *Big Data, Mining, and Analytics*. https://doi.org/10.1201/b16666
- Rosner, S. (2010). *Fundamentals of Biostatistics* (7th ed.). Brooks/Cole.
- Richards, D. (2007). Types of data. *Evidence-based Dentistry*, *8*(2), 57–58. https://doi.org/10.1038/sj.ebd.6400501
- He, X., Zhao, K., & Chu. (2021). AutoML: A survey of the state-of-the-art. *Knowledge Based Systems*, *212*, 106622. https://doi.org/10.1016/j.knosys.2020.106622
- Mehta, P. (2014, December 2). How to Calculate Standard Deviation in 3 different Series? - Explained! *Economics Discussion*. https://www.economicsdiscussion.net/articles/how-to-calculate-standard-deviation-in-3-different-series-explained/2571

MODULE 11

Scoping Review

Class Duration: 60 Minutes

Module Description

This module briefly outlines the definition and key characteristics of Systematic and Scoping review . It involves purpose , benefits and steps of conducting systematic and scoping review. Hierarchy of evidence , tools and relevant case study related to scoping review in long covid are included.

Learning objectives:

- To define systematic and scoping review
- To understand importance and benefits of systematic and scoping review
- To know the methodology of conducting systematic and scoping review

Learning outcomes:

Upon completion of this module students will be able to:

- understand definition of systematic and scoping review
- understand purpose, benefits , key characteristics of systematic and scoping review
- know the methodology of conducting systematic and scoping review

Content:

1. Definition and key characteristics of systematic review
2. Purpose and benefits of systematic review
3. Definition and characteristics of scoping review
4. Purpose and benefits of scoping review
5. Hierarchy of evidence
6. Formulating research question
7. Conducting thorough research of existing information
8. Selection of studies
9. Appraising quality of studies
10. Data extraction
11. Summarizing evidence
12. Case study
13. References

Suggested Reading Material:

1. Anderson, J., Howarth, E., Vainre, M., Humphrey, A., Jones, P. B., & Ford, T. (2020). Advancing methodology for scoping reviews: recommendations arising from a scoping literature review (SLR) to inform transformation of Children and Adolescent Mental Health Services. *BMC Medical Research Methodology*, *20*(1). https://doi.org/10.1186/s12874-020-01127-3
2. Pollock, D., Davies, E., Peters, M. D. J., Tricco, A. C., Alexander, L., McInerney, P., Godfrey, C., Khalil, H., & Munn, Z. (2021). Undertaking a scoping review: A practical guide for nursing and midwifery students, clinicians, researchers, and academics. *Journal of Advanced Nursing*, *77*(4), 2102–2113. https://doi.org/10.1111/jan.14743
3. Mellor, L. (2021, May 4). *The difference between a systematic review and a meta-analysis - Covidence*. Covidence. https://www.covidence.org/blog/the-difference-between-a-systematic-review-and-a-meta-analysis/#:~:text=Some%20systematic%20reviews%20present%20their,considering%20each%20study%20individually%20%F0%9F%8E%AF.

4. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., & McGuinness, L. A. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *British Medical Journal*, *372*(71). https://doi.org/10.1136/bmj.n71
5. Grainger, R., Devan, H., Sangelaji, B., & Hay-Smith, J. (2020). Issues in reporting of systematic review methods in health app-focused reviews: A scoping review. *Health Informatics Journal*, 146045822095291. https://doi.org/10.1177/1460458220952917
6. Sargeant, J. M., & O'Connor, A. M. (2020). Scoping Reviews, Systematic Reviews, and Meta-Analysis: Applications in Veterinary Medicine. *Frontiers in Veterinary Science*, *7*. https://doi.org/10.3389/fvets.2020.00011

MODULE 12

MANUSCRIPT WRITING

Class Duration: 60 minutes

Module Description- The Scientific Manuscript Writing module is designed to equip participants with the essential knowledge and skills required to plan, prepare, and write high-quality scientific research papers and reports. The module covers key elements of a research paper, reporting guidelines for different study types, ethical considerations in research, citation and referencing tools, authorship criteria, and awareness about predatory journals.

Learning objective

- To know the key elements of a research paper.
- To recognize the structure of key elements.
- To learn about reporting guidelines for study types.

- To know tools for citing and managing references.
- To identify the criteria for authorship in a scientific paper.
- To learn about predatory journals

Learning outcomes:

Upon completion of this module students will be able to:

- To plan and prepare well-written scientific research papers and reports.
- To describe the structure of a scientific paper.
- To practice ethics and scientific integrity while reporting and writing a scientific research article
- To communicate the result using appropriate scientific terminology and formatting.

Content:

- Introduction to Manuscript writing .
- Features of scientific writing
- Elements of scientific paper (Introduction, methods, result, discussion, conclusion, abstract) IMRAD
- Ethics in research (plagiarism, authorship)
- Citations and references as per the journal format
- Citation manager tools (Endnote, Zotero)

Suggested Reading Material:

- *writing biomedical manuscripts part I: fundamentals and general rules*. (2011, June 1). PubMed. https://pubmed.ncbi.nlm.nih.gov/22120477/
- Bahadoran, Z., Mirmiran, P., Kashfi, K., & Ghasemi, A. (2019). The principles of biomedical scientific writing. International journal of endocrinology and metabolism, 17(4).

- Bahadoran, Z., Mirmiran, P., Kashfi, K., & Ghasemi, A. (2019). The Principles of Biomedical Scientific Writing: Title. *International Journal of Endocrinology and Metabolism*, *17*(4). https://doi.org/10.5812/ijem.98326
- *ICMJE | Recommendations | Preparing a manuscript for submission to a medical journal*. (n.d.). http://www.icmje.org/recommendations/browse/manuscriptpreparation/preparing-for-submission.html#b
- *Title, abstract and keywords | Springer — International publisher*. (n.d.). https://www.springer.com/gp/authors-editors/authorandreviewertutorials/writing-a-journalmanuscript/title-abstract-and-keywords/10285522

Module 13

Data analysis-2

Class Duration: 60 minutes

Module Description:

This module helps to understand the importance of vital statistics. It also describes in detail about the Vital Index. It also gives information about incidence, prevalence. The module will also discuss the uses and importance of vital statistics. It will describe in detail the future and scope of healthcare data analysis.

Learning objectives:

- To understand the significance of the data analysis
- To comprehend vital statistics and vital index
- To know and describe various measures of morbidity
- To obtain hands-on experience by solving sample data sheet

Learning outcomes:

Upon completion of this module students will be able to:

- Develop skills of data analysis
- Proficiency in calculating various measures of morbidity
- Analyze, interpret and infer the given set of data
- Gain insights about various indicators and applying those methods to solve problems in epidemiological settings

Content:

a) Vital Statistics
b) Types of important vital statistics
c) Vital Index
d) Crude Birth Rate
e) Gross Reproduction Rate
f) Net Reproduction Rate
g) Measures of Morbidity
h) Specific Death Rate
i) Uses and importance of Vital Statistics
j) Sources of Vital Statistics in India
k) Future and Scope of Healthcare Data analysis
l) Hands on analysis on Data sheet

Suggested Reading Material:

Kumar, K., Saikia, N., & Diamond-smith, N. (2022). Performance barriers of Civil Registration System in Bihar: An exploratory study. *PLOS ONE*, *17*(6), e0268832. https://doi.org/10.1371/journal.pone.0268832

Schulz, K., Gaither, K., Zigler, C., Urban, T., Drake, J. M., & Bukowski, R. (2022). Optimal mode of delivery in pregnancy: Individualized predictions using national vital statistics data. *PLOS Digital Health*, *1*(12), e0000166–e0000166. https://doi.org/10.1371/journal.pdig.0000166

Balal, S., Ansari, A. S., Sim, P. Y., Juwale, H., Ismailjee, M. A., Hussain, R., Ahmad, S., & Sharma, A. (2023). The incidence and prevalence of recurrent corneal erosion syndrome in London, UK. *Eye*. https://doi.org/10.1038/s41433-023-02490-3

Cheung, K. W., Seto, M. T.-Y., Wang, W., So, P. L., Hui, A. S. Y., Yu, F. N.-Y., Chung, W. H., Shu, W., Yim, M., Au, T. S.-T., Lo, T. K., & Ng, E. H. Y. (2023). Characteristics of Maternal Mortality Missed by Vital Statistics in Hong Kong, 2000-2019. *JAMA Network Open*, *6*(2), e230429. https://doi.org/10.1001/jamanetworkopen.2023.0429

Shen, T., Lazzari, E., & Vladimir Canudas-Romo. (2023). The contribution of survival to changes in the net reproduction rate. *Population Studies-a Journal of Demography*, *77*(2), 163–178. https://doi.org/10.1080/00324728.2023.2187441

MODULE 14

Focus group interviews and Qualitative data

Class Duration: 60 minutes

Module Description

Qualitative data is essential to research. In this module students will learn the importance of qualitative research. They will gain an understanding on the various methods used to conduct qualitative research.

Learning objectives:

- To understand the need for Qualitative Research
- To interpret the use of various methods in Qualitative research
- To describe FGD'S, In-depth interviews, Case studies

Learning outcomes:

Upon completion of this module students will be able to:

- Recognize the difference between qualitative and quantitative research
- Compare FGD'S and In-depth interviews
- Critique which method to use in qualitative research

Content:

- Qualitative Research Introduction
- Advantages of Qualitative Research
- Qualitative Research Process
- Data visualization techniques and software used for Qualitative Research
- Overview of FGD's
- Overview of In-depth Interviews
- Observation
- Case Studies
- How to choose Qualitative Methods?

Suggested Reading Material:

1. *Participant Observation WHAT IS PARTICIPANT OBSERVATION?* (n.d.). https://www.sagepub.com/sites/default/files/upm-binaries/48454_ch_3.pdf
2. Fix, G. M., Kim, B., Ruben, M. A., & McCullough, M. (2022). Direct observation methods: A practical guide for health researchers. *PEC Innovation*, *1*, 100036–100036. https://doi.org/10.1016/j.pecinn.2022.100036
3. M. Teresa Anguera, Portell, M., Salvador Chacón Moscoso, & Sanduvete-Chaves, S. (2018). Indirect Observation in Everyday Contexts: Concepts and Methodological Guidelines

within a Mixed Methods Framework. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00013

4. Arya Priya. (2021). *Case Study Methodology of Qualitative Research: Key Attributes and Navigating the Conundrums in Its Application - Arya Priya, 2021*. Sociological Bulletin. https://journals.sagepub.com/doi/full/10.1177/0038022920970318#:~:text=Case%20Studies%20are%20a%20qualitative,a%20sustained%20period%20of%20time.
5. Tümen Akyıldız, Seçil & Ahmed, Kwestan. (2021). An Overview of Qualitative Research and Focus Group Discussion. International Journal of Academic Research in Education. 10.17985/ijare.866762.
6. Coleman, P. (2020). *Special Article In-Depth Interviewing as a Research Method in Healthcare Practice and Education: Value, Limitations and Considerations*. 3–1879.

Academic Integrity and Professional Conduct:

The University established policy on academic integrity and professional conduct will be followed. This policy may be found in the Student Handbook. All graduate students are expected to adhere scrupulously to this policy. Cheating, academic misconduct, fabrication, and plagiarism are viewed as serious matters and will lead to disciplinary action as described in the Student Handbook under

Procedural Rules Relating to Student Discipline. Additional materials related to Responsible Conduct in Research can be found in the Student Handbook.

A violation of the standards of academic integrity is viewed as a very serious matter at university. Any violation of the academic integrity and professional conduct policy will result in a zero grade for the assignment or exam in question. A second offense will result in an F for the course. Violations will be reported to the student's Department Chair and the Associate Dean for Academic and Student Affairs and may be entered into the student's academic record. This record may affect future job opportunities.

Cheating: A general definition of cheating is the use or attempted use of unauthorized materials or information for an academic exercise. Examples of cheating include but are not limited to:

1. Using unauthorized materials such as books, notes, calculators or other aids during an examination or other academic exercises;
2. receiving unauthorized assistance from another person during an exam or exercise such as copying answers, receiving answer signals, conversation or having another person take an examination for you;
3. providing assistance to another person during an exam or exercise, such as allowing your answers to be copied, signaling answers or taking an exam for someone else;
4. obtaining answers and/or other information without authorization from someone who has previously taken an examination;
5. including all or a portion of previous work for another assignment without authorization

Academic Misconduct: Academic misconduct is defined as the falsification of official documents and/or obtaining records, examinations or documents without authorization. Several examples of academic misconduct are:

1. the unauthorized acquisition of all or part of an unadministered test;
2. selling or otherwise distributing all of part of an unadministered test;
3. changing an answer or grade on an examination without authorization;
4. falsification of information on an official university document such as a grade report, transcript, an instructor's grade book or evaluation file or being an accessory to an act of such falsification;
5. forging the signature of an authorizing official on documents such as letters of permission, petitions, drop/add, transcripts, and/or other official documents;
6. unauthorized entry into a building, office, file or computer database to view, alter or acquire documents.

Plagiarism: Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit, i.e. an appropriate attribution or citation. Some examples are:

1. In the methods section of a thesis, a graduate student describes a procedure used in research for the thesis. The procedure was developed by a fellow graduate student in the laboratory of their major professor; however, neither the student who developed this procedure nor the major professor was given credit in the thesis. This implies that the author of these had himself developed the procedure.
2. In the background section of a thesis, a graduate student quotes verbatim the results of a previous investigator's work but fails to credit the individual through citation. The work is recent and thus cannot be considered common knowledge.