



SCHOOL OF MEDICAL SCIENCES
HEALTH CAMPUS
UNIVERSITI SAINS MALAYSIA

MASTER OF SCIENCE MEDICAL STATISTICS

Name:

Registration no.:

MASTER OF SCIENCE (MEDICAL STATISTICS)

Master of Science program (Medical Statistics) is aimed to give in-depth knowledge and the skills in application of statistical methods and research data analysis related to health. This course is designed to produce a competent graduate in Medical Statistics to work effectively as an important expert of collaboration team to investigate health related problems. Successful graduates are expected to have a career as medical statisticians in an academic or research institution, or pharmaceutical industries.

1. PROGRAM OBJECTIVE

- ✚ To prepare the opportunities to further study in the field of medical statistics at the postgraduate level.
- ✚ To deliver in-depth knowledge of application of statistical methods in analyzing health-related data.
- ✚ To equip students with the use of statistical methods in health problem research and in

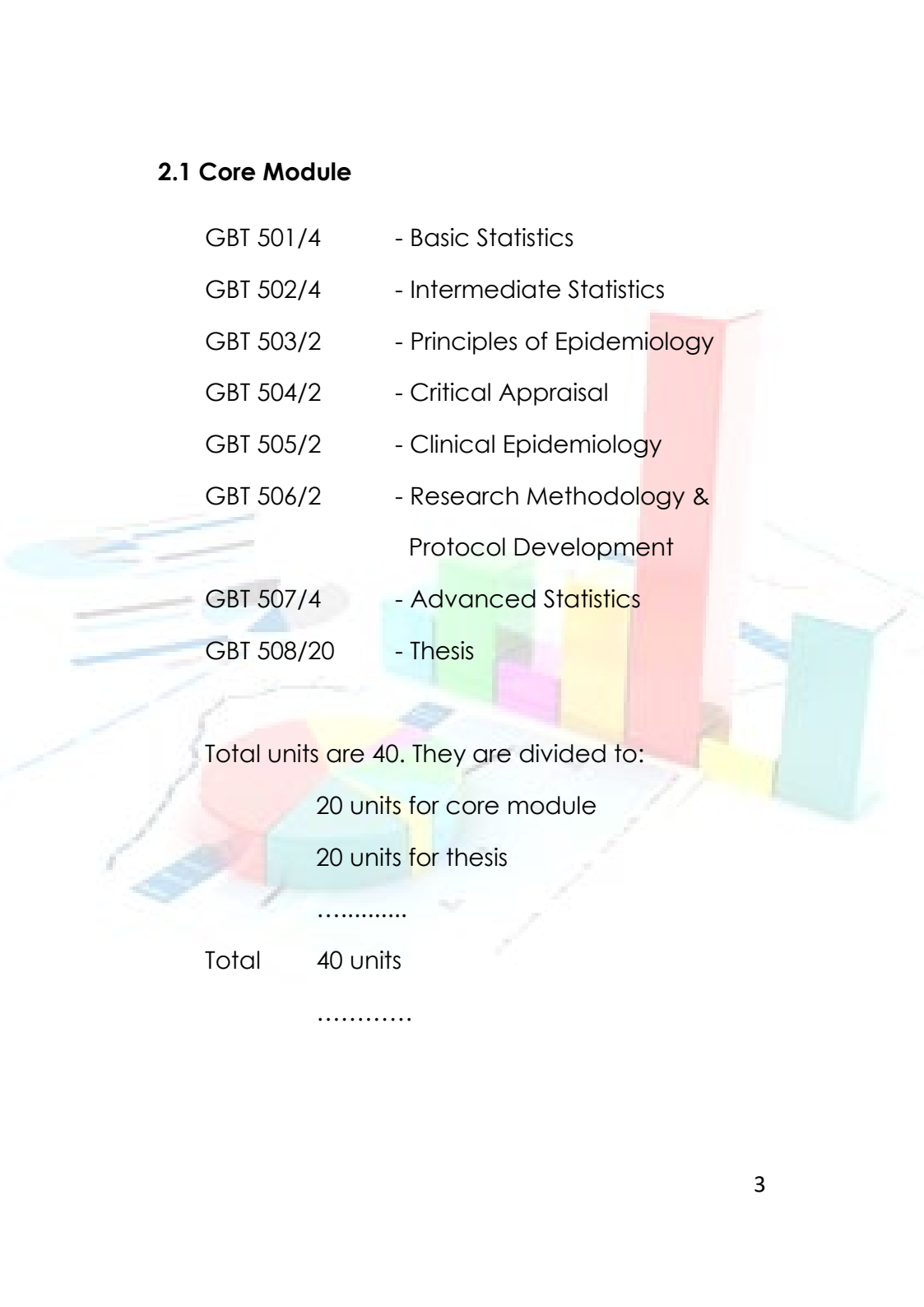
medical field.

2. CURRICULUM STRUCTURE

The course is divided to four semesters including course work and thesis writing. The courses are as follows:

Year	Semester	Month	Course	Credit Units
1	1	Sept - Jan	GBT 501/4	4
			GBT 502/4	4
		GBT 503/2	2	
SEMESTER 1 EXAMINATION (JANUARY)				
1	2	Feb - June	GBT 504/2	2
			GBT 505/2	2
		GBT 506/2	2	
		GBT 507/4	4	
SEMESTER 2 EXAMINATION (JUNE)				
COURSE DURING LONG SEMESTER BREAK [KSCP] EXAMINATION (AUGUST)				
2	3	Sept - June	GBT 508/20	20
VIVA-VOCE (JUNE)				

2.1 Core Module



GBT 501/4	- Basic Statistics
GBT 502/4	- Intermediate Statistics
GBT 503/2	- Principles of Epidemiology
GBT 504/2	- Critical Appraisal
GBT 505/2	- Clinical Epidemiology
GBT 506/2	- Research Methodology & Protocol Development
GBT 507/4	- Advanced Statistics
GBT 508/20	- Thesis

Total units are 40. They are divided to:

20 units for core module

20 units for thesis

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Total 40 units

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3. COURSE STRUCTURE

3.1 Semesters 1 and 2 Assessment (Year 1)

Semester 1 comprises of 3 subjects and semester 2 comprises of 4 subjects. The assessment consists of:

- a) Continuous assessments (30%)
- b) Semester final examination (70%)

3.1.1 Continuous Assessment

Continuous assessments consist of written assignments, presentations, in-class assessments, or task in the form of software which can be brought back as an out-of-class assignment. Students are compulsory to submit the assignments to their respective lecturers to be examined within the stipulated period. Continuous assessments are the prerequisite to sit for the semester final examination and contributed to 30% of the final marks.

3.1.2 Final Examination Semester 1 and 2 (Year 1)

Final examination is held at the end of every last semester, which are semester 1, semester 2 and KSCP. Students will sit for examination for the

registered course during course registration in each semester. Each student must first pay all the fees and meet the requirements for lectures / tutorials / prerequisites and other requirements for each course before qualifying to sit for the examination for all the registered courses. Students who failed the examination in semester 1 and semester 2 examinations may re-sit the courses offered during KSCP.

Students will be barred from taking the examination if they do not meet these requirements. All students must attend at least 70% of lectures / tutorials and participate in academic activities. Students are also required to prepare and submit all assignments / projects.

Passing grade is C+ = 2.33. Students need to achieve C+ grade to be considered PASS.

Types of examination include:

- i. Multiple Essay Question [MEQ]
- ii. Short essay
- iii. Practical / hands-on software

Students who fail the courses may re-sit the subject course within the period given and the availability of examinations decided by Unit of Biostatistics. Students are allowed to re-sit the course to achieve CGPA to 3.00. Repeated examination will be offered during KSCP or at the new semester. CGPA will be counted based on the best grade.

3.2 Semester 1 and 2 (Year 2)

The research protocol needs to be presented to the panel of judges comprising a panel of lecturers for approval when taking Research Methodology & Protocol Development course during semester 2 year 1. Data collection can be started during semester 1, while data analysis and thesis writing must be finished in the middle of semester 2 year 2.

Research / thesis project must be completed within the allocated time.

There is no written examination taken for this semester. The assessment for year 2 is based on the progression of the research project and the satisfying of thesis writing at the end of Year 2.

3.2.1 Selection for research project / thesis

There are three research selections:

a) Primary data research

It refers to data collection which can answer the research questions to meet the scientific publishing requirements. The data is collected by the students for research /thesis project.

b) Secondary data analysis

It emphasizes on data analysis and discussion as the research methodology which has been set up from the beginning. Data had been collected by others for another purpose but was used by the students for research /thesis project

c) Systematic review and meta-analysis

Students can conduct the systematic review and meta-analysis related to the fields.

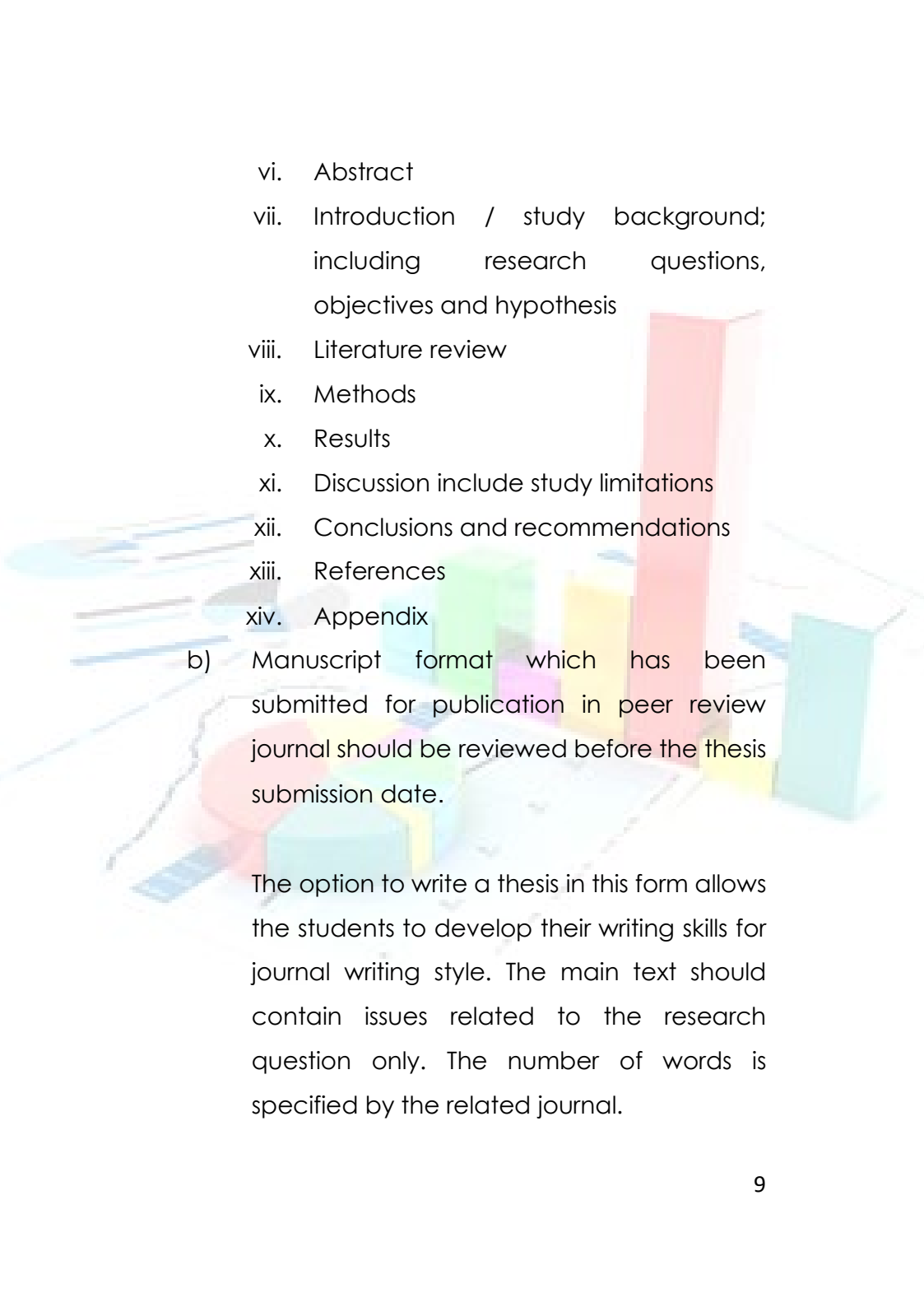
3.2.2 Thesis examination

Thesis will be examined by at least two examiners. Supervisor is not allowed to be the examiners. All the examiners will be decided by the Unit, and will be supported by School of Medical Sciences Council, USM.

3.2.3 Thesis writing format

The completed thesis must be submitted in one of two formats:

- a) Thesis format containing chapters. The length of the thesis must not have exceeded to 50,000 words. Thesis structure included:
 - i. Title and student's full name
 - ii. Acknowledgement
 - iii. Table of contents
 - iv. List of tables and figures
 - v. List of symbols and abbreviations

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- vi. Abstract
 - vii. Introduction / study background;
including research questions,
objectives and hypothesis
 - viii. Literature review
 - ix. Methods
 - x. Results
 - xi. Discussion include study limitations
 - xii. Conclusions and recommendations
 - xiii. References
 - xiv. Appendix

b) Manuscript format which has been submitted for publication in peer review journal should be reviewed before the thesis submission date.

The option to write a thesis in this form allows the students to develop their writing skills for journal writing style. The main text should contain issues related to the research question only. The number of words is specified by the related journal.

This writing format is the same format that most journals have recommended as follows:

- i. Title
- ii. Author's name
- iii. Author's affiliation
- iv. Author's name and address for the correspondence purpose
- v. Abstract
- vi. Introduction including objective of the study
- vii. Materials and methods
- viii. Results
- ix. Discussion and conclusion
- x. Acknowledgement
- xi. References

The format of thesis should include completed statistical analysis as the appendix.

All the formats are subject to approval by the Unit, and are supported by School of Medical Sciences Council, USM.

3.2.4 Thesis submission

Students should submit six copies of the thesis to the postgraduate office.

3.2.5 Viva-voce

Students are required to present and defend their thesis to the examiners during the viva-voce session to meet the partial requirements for graduation. Thesis will be evaluated as a Pass or Fail.

3.2.6 Failure in submitting the thesis / failed to get a passing grade for thesis

Students will not be awarded as a Master's Degree if they fail to submit the thesis or fail to obtain passing grade for the thesis. In this case, the students will be given another two semesters to conduct a new research / thesis project.

3.3 Grading System

Grade	Grade point	Marks
A	4.00	80 – 100
A-	3.67	70 – 79.9
B+	3.33	64 – 69.9
B	3.00	58 – 63.9
B-	2.67	52 – 57.9
C+	2.33	46 – 51.9
C	2.00	40 – 45.9
C-	1.67	36 – 39.9
D+	1.33	32 – 35.9
D	1.00	28 – 31.9
D-	0.67	25 – 27.9
F	0.00	0 - 24.9

Passing grade is C+ (2.33).

3.4 Graduation Requirement

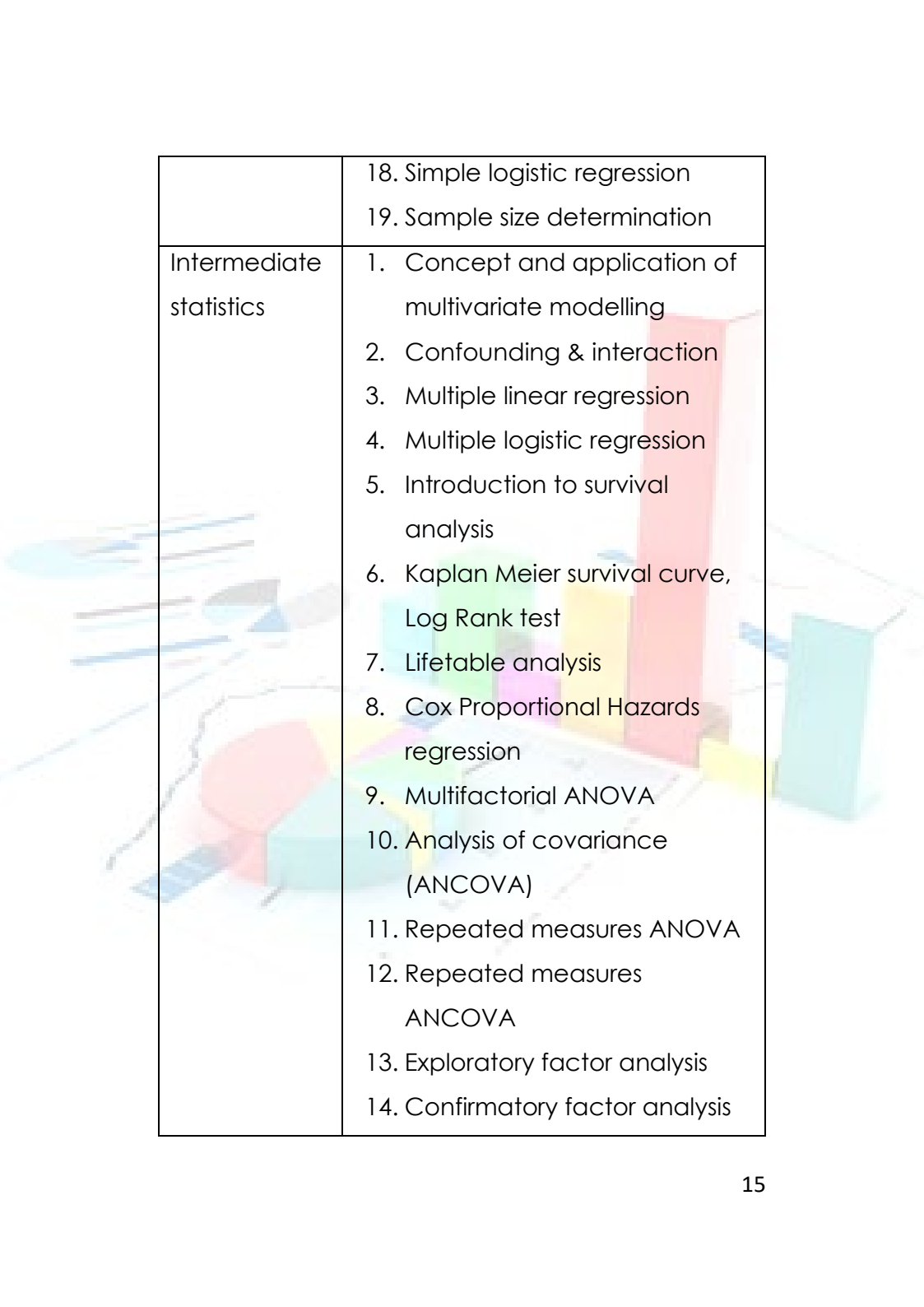
- i. Pass a dissertation
- ii. Achieve a CGPA 3.00; and
- iii. Meet the minimum and maximum duration of candidature



3.5 Topics for the Courses

Semester 1

Courses	TOPICS
Basic Statistics	<ol style="list-style-type: none">1. Introduction to biostatistics2. Descriptive statistics3. Introduction to SPSS4. Probability theory5. Normal, binomial and Poisson distribution6. Sampling distributions7. Hypothesis testing8. Estimation9. Independent t test10. Paired t test11. One-way ANOVA test12. Correlation13. Simple linear regression14. Non parametric tests15. Pearson's chi-square & Fisher Exact test16. McNemar test17. Mantel Haenzel test



	18. Simple logistic regression 19. Sample size determination
Intermediate statistics	1. Concept and application of multivariate modelling 2. Confounding & interaction 3. Multiple linear regression 4. Multiple logistic regression 5. Introduction to survival analysis 6. Kaplan Meier survival curve, Log Rank test 7. Lifetable analysis 8. Cox Proportional Hazards regression 9. Multifactorial ANOVA 10. Analysis of covariance (ANCOVA) 11. Repeated measures ANOVA 12. Repeated measures ANCOVA 13. Exploratory factor analysis 14. Confirmatory factor analysis

	15. Introduction to Structural Equation Modelling
Principles of Epidemiology	<ol style="list-style-type: none"> 1. Introduction & Practical Application of Epidemiology 2. Natural history of diseases & levels of prevention 3. Models of disease causation 4. Measurements of disease occurrence 5. Measurements of risk and association 6. Standardization of rates 7. Epidemiological study design: Descriptive 8. Epidemiological study design: Observational 9. Epidemiological study design: Experimental (Clinical & Community Trials) 10. Sampling methods 11. Bias & errors 12. Systematic Review

	13. Meta-analysis
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Semester 2

SUBJECT	TOPICS
Critical Appraisal	<ol style="list-style-type: none"><li>1. How to read a journal article<li>2. Introduction to evidence-based practice<li>3. Critical appraisal worksheet<li>4. Appraising cohort studies<li>5. Appraising case-control studies<li>6. Appraising cross-sectional studies<li>7. Appraising randomized controlled trials<li>8. Appraising community trials<li>9. Appraising validation studies<li>10. Appraising systematic reviews<li>11. Appraising meta-analyses
Clinical Epidemiology	<ol style="list-style-type: none"><li>1. Clinical agreement<li>2. Screening & diagnostic test<li>3. Prognosis<li>4. Overview of clinical trials



	<ol style="list-style-type: none">5. Randomization in clinical trials6. Blinding in clinical trials7. Outcome measures in clinical trials8. Analysis in clinical trials9. Non-randomized controlled trials10. Community trials11. Ethics in clinical trials
Research Methodology & Protocol Development	<ol style="list-style-type: none">1. Research protocol development2. Literature search3. Literature review4. Formulation of research questions, hypotheses & objectives5. Matching research question with study design6. Data collection methods7. Questionnaires design8. Validity & reliability in measurement tools

	<ul style="list-style-type: none"> 9. Data management 10. Selection of appropriate analysis (expected results & dummy tables) 11. Referencing 12. Endnote application
Advanced Statistics	<ul style="list-style-type: none"> 1. Overview of multivariate analysis 2. Introduction to STATA 3. Multivariate analysis of variance – MANOVA 4. Multivariate analysis of variance – MANCOVA 5. Repeated measures in categorical data 6. Advanced topic in poisson & loglinear model 7. Advanced topic in multiple Linear Regression 8. Multinomial logistic regression 9. Ordinal logistic regression 10. Conditional Logistic

	Regression 11. Structural Equation Modelling
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4. REFERENCES

4.1 Main references

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