



COLLEGE OF INFORMATION TECHNOLOGY  
DEPARTMENT OF IT  
COURSE SYLLABUS/ SPECIFICATION

<b>Course Code &amp; Title:</b>	<b>ITCS 550 – Research Methods and Modeling</b>
<b>Weight:</b>	<b>(3-0-3)</b>
<b>Prerequisite:</b>	<b>Successful completion of at least 9 credits</b>
<b>NQF Level Allocated:</b>	<b>9</b>
<b>NQF Notional Hours / Credits:</b>	<b>120 notional hours/ 12 NQF credit</b>

**Description:** The course provides knowledge and skills in useful qualitative and quantitative research methods with the aim of enabling Master students to carry out their independent research and to execute and plan their research projects in IT and Computer Science. Particular focus of the course is to enable students to independently do literature review, to formulate their research problem, to conceptualize their research design and to write their final report. It also familiarizes students with Ahlia University guidelines for Master dissertation.

**Objective:**

1. To introduce various types of research techniques in IT and Computer Science
2. To explain how to formulate a research problem and conceptualize an appropriate research design
3. To demonstrate how to apply research ethics including perils of plagiarism and importance of acknowledging other people's work and proper way of referencing
4. To explain various qualitative and quantitative research methods used in IT and Computer Science
5. To encourage students to develop their independent research proposals.
6. To encourage students to conduct independent research in the field of IT and Computer Science

Semester: 2<sup>nd</sup> 2018-2019

Instructor (s): Dr. Sohail Safdar

Office Telephone: EXT: 8698

Email (s): ssafdar@ahlia.edu.bh

**Intended Learning Outcomes (ILOs):**

<b>A. Knowledge and Understanding</b>		<b>NQF Descriptor/ Level</b>
<b>A1</b>	<b>Concepts and Theories:</b> Demonstrate knowledge and understanding of concepts and theories of quantitative and qualitative research methods as applied in Information Technology (IT) and Computer Science.	Knowledge: theoretical understanding [Level 9]
<b>A2</b>	<b>Contemporary Trends, Problems and Research:</b> Understand contemporary trends and best practices of research in the field of Information Technology (IT) and Computer Science.	Knowledge: theoretical understanding [Level 9]
<b>A3</b>	<b>Professional Responsibility:</b> Demonstrate cognizance of, and adhere to, the professional and legal standards of research in IT and Computer Science and develop continuing awareness of best practices used in the production and publication of research work in these areas.	Knowledge: theoretical understanding [Level 9]

<b>B. Subject-specific Skills</b>		<b>NQF Descriptor/ Level</b>
<b>B1</b>	<b>Problem Solving:</b> Solve quantitative problems encountered in IT and Computer Science research (formulating/testing hypos).	Knowledge: Practical Application [Level 9] Skills: Communication, ICT & Numeracy [Level 9]
<b>B2</b>	<b>Modeling and Design:</b> Conceptualize and apply qualitative and quantitative research designs in IT and Computer science.	Generic problem solving and analytical skills [Level 9] Knowledge- Practical application [level 9]
<b>B3</b>	<b>Application of Methods and Tools:</b> Employ methods of data gathering and apply tools (software) applicable to and encountered in practical problems of research in various areas of interest.	Generic problem solving and analytical skills [Level 9]

		Knowledge – Practical application [Level 9] Communication, ICT and Numeracy Skills [Level 9]
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<b>C. Critical-Thinking Skills</b>		<b>NQF Descriptor/ Level</b>
<b>C1</b>	<b>Analytic skills:</b> Evaluate real world research problems in conceptual terms; identify the appropriate research and computational methods (input) needed to solve them and analyze the output accordingly generated using quantitative or qualitative techniques.	Generic problem solving and analytical skills [Level 9]
<b>C2</b>	<b>Synthetic:</b> Integrate various research findings to generate coherent conclusions and recommendations to achieve long-term objectives and demonstrate the complex issues and problems in Information Technology (IT) and Computer Science.	Generic problem solving and analytical skills [Level 9]
<b>C3</b>	<b>Creative:</b> Utilize outcomes of research to generate new and novel research questions in the field of IT and computer science.	Generic problem solving and analytical skills [Level 9] Competence: Autonomy, Responsibility and Context [Level 9]

<b>D. General and Transferable Skills (other skills relevant to employability and personal development)</b>		<b>NQF Descriptor/ Level</b>
<b>D1</b>	<b>Communication:</b> Effectively communicate in written and oral form, and using technical and non-technical language, to present the outcomes of research findings in written and oral form clearly and successfully.	Communication, ICT and Numeracy Skills [Level 9]
<b>D3</b>	<b>Organizational and Developmental Skills:</b> Engage in life-long learning and continuing self-development to hone professional and organizational skills required in IT and Computer Science research.	Competence: Autonomy, Responsibility and Context [level 9]
<b>D4</b>	<b>Ethical and Social Responsibility:</b> Recognize, value, and demonstrate current ethics as applied to research in technical fields and social issues likely to be encountered in current use of Information Technology (IT) and Computer Science.	Competence: Autonomy, Responsibility and Context [Level 9]

## Course Structure (Outline)

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Week	Hours		ILOs	Topics	Teaching Method	Assessment Method
	Lec.	Lab				
1	3	-	A1, A2	<b>Types of Research</b> Types of Research – Application Perspective, Objective Perspective, Mode of Enquiry perspective	Lecture, Class discussions	To be covered in Interim Project
2	3	-	A2	<b>Formulating a Research Problem</b> Literature Review, Research Objectives	Lecture, Class discussions	To be covered in Interim Project
3	3	-	A1,B1, C1	Identifying Study Population, Identifying Variables, Constructing Hypotheses	Lecture, Class discussions	To be covered in Interim Project
4	3	-	A1,A2,B 1	<b>Conceptualizing a Research Design</b> Meaning of Research Design, Important Functions of Research Design, Study Designs in Qualitative and Quantitative Research	Lecture, Presentation, Oral Inquiry, Class discussions	To be covered in Interim Project
5	3	-	A1, A2, B1	<b>Construction of Tools/Instruments of Research</b> Methods of Data Collection, Attitudinal Scales, Measurement Scales, Validity and Reliability	Lecture, Presentation, Oral Inquiry, Class discussions in Group	To be covered in final Project
6	3	-	A2,D1	<b>Writing a Research Proposal</b> Stating the Problem, Objectives of the Study, Hypotheses to be Tested	Lecture, Presentation, Oral Inquiry, Class discussions in Group	To be covered in final Project

7	3	-	A2,D1	<b>Writing a Research Proposal continued</b> University Guidelines for Master Dissertation	Lecture, Presentation, Oral Inquiry, class discussions in Group	To be covered in final Project
8	3	-	A1,B1	<b>Selecting an Appropriate Sample Size</b> Concept of Sampling, Methods of Sampling, Calculation of Sample Size	Lecture, Class discussions	To be covered in final Project/ Major Exam
9	3	-	A2, A3, D4	<b>Research Ethics</b> Ethical Issues Including Perils of Plagiarism, Acknowledging Other Peoples' Work, Proper Ways of Referencing.	Lecture, Class discussions	To be covered in final Project/ Major Exam
10	3	-	A1,B1,C1,C2	<b>Quantitative Research Methods</b> Estimation, Confidence Intervals, Construction of the Null Hypothesis and the Alternative Hypothesis	Lecture, Presentation, Oral Inquiry, Class discussions	To be covered in final Project / Major Exam
11	3	-	A1,B1,B3,C1	<b>Quantitative Research Methods Continued</b> ANOVA, Linear Regression and Correlation, Using Some Important Software including Excel and SPSS	Lab session and software demo, Class discussions	To be covered in final Project/ Major Exam
12	3	-	A1,B1,B3, C1,C2	<b>Quantitative Research Methods Continued</b> Multiple Linear Regression and Correlation, Using Some Important Software including Excel and SPSS	Lab session and software demo, Class discussions	To be covered in final Project/ Major Exam
13	3	-	A2, C1	<b>Report Writing</b> Interpretation of Results, Conclusions, Limitations of	Lecture, Presentation, Oral	To be covered in final Project

				Study, Suggestions for Further Research	Inquiry, Class discussions	
14	3	-	A2, A3, C3, D3	<b>Report Writing Continued</b> University Guidelines for Writing Master Dissertation	Lecture, Presentation, Oral Inquiry, Class discussions	To be covered in final Project
15	3	-	A1, A2, B1, C1	<b>Presentations</b>	Discussion	Evaluation of Interim Project
16	2		A1, A2, A3, B1, B2, B3, C1, C2, C3, D1, D3, D4	<b>Presentations</b>		<b>Final Project</b>

\* Formative assessment

### Teaching Materials:

<b>Textbook(s):</b>	<p>1- Ranjit Kumar, <i>Research Methodology – A Step by Step Guide for Beginners</i>, 5<sup>th</sup> Edition, SAGE, 2019, <b>ISBN-10:</b> 1526449900, <b>ISBN-13:</b> 978-1526449900</p> <p>2- John W. Creswell, J. David Creswell, <i>Research Design: Qualitative, Quantitative, and Mixed Methods Approaches</i> Fifth Edition, SAGE Publications, Inc, 2018, ISBN: 1506386709.</p>
<b>Handout(s):</b>	PowerPoint slides available on Moodle i.e. <a href="http://www.ahlia.edu.bh/moodle">http://www.ahlia.edu.bh/moodle</a>
<b>Reference(s):</b>	<p>1. Manuel Mora, <i>Research Methodologies, Innovations and Philosophies in Software Systems</i>, Engineering and Information, IGI Global, 2012.</p> <p>2. Monique Hennink, Inge Hutter and Ajay Bailey, <i>Qualitative Research Methods</i>, SAGE, 2011. ISBN: 9781412922265.</p> <p>3. C. R. Kothari, <i>Research Methodology: Methods and Techniques</i>, 2nd Edition, New Age International, , ISBN: 81224125223</p> <p>4. Martin S. Olivier, , <i>Information Technology Research – A Practical Guide for Computer Science and Informatics</i>, 3rd Edition, Van Schaik, 2009, ISBN: 9780627027581.</p>

## Assessment

Method of Assessment	Description	Learning Outcomes	Weighting
Major Exam	Written exam to assess student skills in research ethics, and methods.	A1, B1, B2, C1	20 %
Project 1	On topics covered in weeks 1-4	A1, A2, B1, C1	20 %
Project 2	A comprehensive research proposal describing the prospective research components eligible for a Masters level	A1, A2, A3, B1, B2, B3, C1, C2, C3, D1, D3, D4	60 %
<b>Overall:</b>			<b>100 %</b>

# Project 1

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## Requirements:

Choose an academic article and produce a critical summary that is no more than 1200 words. The article should be recent i.e. published after 2009. Your summary can be based on answering the questions given the section below (where appropriate). Please do not write just a list of answers. It is important to provide a cohesive summary that has within it the answers.

### ***Summary contents (questions you should answer about the paper):***

#### **Research problem formulation**

Is the research problem sufficiently important? Is it likely to produce new or useful information? Is the problem complex? Are prior theory and (if there) empirical work explained clearly? Are the outcomes stated clearly? Are the outcomes justified?

#### **Literature Review**

Does the investigator demonstrate familiarity with pertinent literature? Is the literature review comprehensive and well organised putting forward clearly the concepts/frameworks the author aims to explore?

#### **Methodology**

Is the chosen methodology appropriate to address the main research question? Are there too many variables included? Is the description of the research design sufficiently clear and specific

to permit rigorous evaluation? Does the author demonstrate familiarity with relevant methodological literature and techniques? Is the data suitable to the research objective?

### **Data Collection**

Are data collection plans realistic? Do they raise ethical issues? Are plans offered for ruling out alternative explanations for results?

### **Findings**

Does the investigator summarise the findings in a concise manner? Are the findings well-articulated and discussed within the literature?

### **Recommendations**

Does the investigator offer recommendations for further research and are they justified adequately? Does the investigator suggest policy recommendations based on the findings? Are they well argued?

## **MARKING SCHEME**

<b>Grade Requirements</b>	<b>Grade</b>
Pass (C): The student has summarised the article in a way that can be understood by the reader without the need to read the original article itself. The student attempted to criticise the article in most of the areas that has been suggested. Also the student is using comparative purposes some of the literature that has been found from the article's references.	Grade C
Very Good (B): gives a well written summary based on an article from a good quality journal. Evidence of further reading is provided. The student has reflected and dealt with many of the issues/suggestions provided with the assignment.	Grade B
Excellent (A): gives an extremely well written summary based on an article from a top rated journal. Evidence of further reading is provided i.e. papers that have been read after the publication of the article used for the assignment. The student has reflected and dealt with most of the issues/suggestions provided with the assignment.	Grade A
Failure to meet the requirements in of C	Other

# **Project 2**

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## Background

You will illustrate the problem which your research will be addressing, explain its academic and industrial context, demonstrate a knowledge and understanding of past and current work in the subject area by synthesising (analysing) at least 5 academic references of relevance to your work.

[the first paragraph will usually introduce the general area of the project]

[the next paragraph(s) will describe some previous work in this area; where you reference previous research use the format "Jones and Bloggs (1999) argued..." or "it has been found that...(Patel, 2002)", i.e. only author surname(s) and date should appear here - full details of the reference appear in the reference list (see below)]

[the final paragraph will present a problem which the discussion of previous work suggests is still unsolved - this should be the problem or question your project will address]

## Aims and Objectives

In this section you should define the overall aim of the project and the specific measurable objectives that you plan to achieve. You should phrase your objectives in a way that once achieved they will demonstrate the successful achievement of the overall project's aim.

[the aim(s) should be general and broad; often it/they can be phrased in terms of solving a practical problem, answering a question or improving a business in some way; stick to one general aim]

[the objectives should be specific and measurable; the sum of your objectives should equal the achievement of the aim(s); it should be possible for you to evaluate your project by assessing whether it has met the objectives]

## Methodological Approach

This should include some information on the general methodological approach you intend to adopt for your study, the accessibility of the data you intend to collect and the techniques you intend to use for data collection and data analysis.

[your project involves producing a solution to a practical problem, the method is the procedure you follow to come up with this solution; often the method will involve some form of interaction with potential participants (e.g. interviews, surveys, case studies, experiments, observations), the analysis of which should inform the solution design; for some projects the method may involve analysis of existing data to inform the solution (examples might include a conceptual analysis based on what others have written, a statistical analysis using an existing data set, or a structured analysis of an existing published data set); try to give a good justification as to why the method you have chosen is suitable for your problem]

[you will most likely want to base your actual methodological approach around an established business and social sciences methodology - you can mention this here but try to keep it brief; if you have chosen a particular methodology just say which one with a brief justification; if you have yet to choose a methodology then mention the candidates and how you intend to choose between them]

## Programme of Work

In this section you should describe the tasks you need to conduct in order to complete the project, identify the major milestones by which you and your supervisor will monitor the progress of your project (e.g. completion of literature review, completion of data collection). The programme of work should be illustrated by a simple diagrammatic work plan showing the major tasks and milestones against a timeline. The work plan is not included in the words limit of the detailed research proposal and represents a one-page 'appendix' to this report.

[the general format of this section is illustrated below:

Task 1: task title (estimated effort N weeks)

[brief description of the task]

Milestone 1: milestone name

[together the tasks you perform should allow you to meet your stated objectives - you may find it helpful to refer to these in writing the task descriptions]

## References

At least 5 academic references relevant to your research proposal using the Harvard style.

[provide an alphabetical list, ordered by first author surname, of all references you cite in the text of this report; the accepted format style for referencing is the Harvard style - search on Google for "Harvard referencing" to find lots of useful resources on how to do this]

[you can adapt the table below to show your own plan; it is fine if you wish to use project planning software to develop your plan, however you must produce a version which can be inserted into the word document which you submit electronically for part 2]

Task Id	Task Name	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9....	Wk n
1	Project Planning					◆					
2	Library Work										
3	Planning Survey							◆			
4	Data Collection										◆

5...												
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= milestone



= key task

## MARKING SCHEME

Grade Requirements	Grade
Pass (C): A coherent response to the requirements of the assessment task: the report's overall structure and writing quality is adequate; the reference list is complete (and organised alphabetically in Harvard format); the word limit is not exceeded; evidence of accurate restatement and organisation of relevant concepts, methodology and material appropriate to writing a short report for the lay person. Clarity of the problem statement and the implementation of the method used.	Grade C
Very Good (B): The requirements for a grade C are met. In addition: <ul style="list-style-type: none"> <li>• Demonstrates skills in organising, presenting and interpreting knowledge from the relevant sources;</li> <li>• Explains the general merits and demerits of any material reviewed;</li> <li>• Is neatly formatted with few typographical or grammatical errors;</li> <li>• Demonstrates a confident level of understanding based on an assured grasp of relevant concepts, methodology and content appropriate to writing a short report.</li> <li>• Evidence of significant skill in interpreting complex material articulated with a high level of competence.</li> <li>• Provide good justifications of the steps followed in selecting, implementing and experimenting with the researched concept.</li> </ul>	Grade B
Excellent (A): The requirements for a grade B are met. In addition: <ul style="list-style-type: none"> <li>• Provide excellent and convincing justifications of the steps followed in selecting, implementing and experimenting with the method used.</li> <li>• Demonstrates excellent skills in interpreting lay information and converting them into a theoretical model.</li> <li>• Demonstrates evidence of a consistently authoritative grasp of concepts, methodology and content appropriate to writing a report, with evidence of depth and confidence in the understanding of issues underpinning the assessment task.</li> </ul>	Grade A
Failure to meet the requirements of C	Other

<b>Admissions</b>	
<b>Pre-requisites</b>	<b>Successful completion of at least 9 credits</b>
<b>Minimum number of students</b>	<b>8</b>
<b>Maximum number of students</b>	<b>20</b>

**Ahlia University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see [www.ahlia.edu.bh/integrity](http://www.ahlia.edu.bh/integrity) for more information).**