



**AMERICAN UNIVERSITY  
OF CYPRUS**

<b>Course Code</b> CSC306	<b>Course Name</b> Research Methods	<b>ECTS Credit</b> 5
<b>Pre-Requisite</b> CSC202	<b>Course Type</b> Compulsory	<b>Language of Instruction</b> English
<b>Year of Study</b> 3 <sup>rd</sup> / 6 <sup>th</sup>	<b>Level of Course</b> BSc/1st Cycle	<b>Mode of Delivery</b> On Campus

**Course Objectives:**

The aim of this module is to introduce students to the nature and conduct of Computing research. The students are encouraged to undertake independent research. Their existing transferable key skills are enhanced. High-order transferable key skills are developed. The students are reminded to follow the Legal, Social, Ethical and Professional (LSEP) principles applicable to the Computing Industry.

**Learning Outcomes:**

By the end of this course students should:

- have an understanding of how established techniques of research are used to extend, created and interpret Computing knowledge.
- have an understanding to critically evaluate current research and propose possible alternative directions for further work.
- be able to deal with complex issues at the forefront of the academic discipline of Computing in a systematic and creative manner.
- be able to communicate research conclusions to both specialists and non-specialists.
- demonstrate self-direction and originality in their research work.
- be able to act autonomously in planning and implementing solutions in a professional manner.
- be able to define and plan a program of independent research.
- participate within the LSEP framework and operate as professionals within the Computing industry. The students are encouraged to participate in professional Computing Societies, such as within the IEEE.
- make use of the qualities and transferable skills necessary for employment requiring: the exercise of initiative and personal responsibility, decision making in complex and unpredictable situations and the independent learning ability required for continuing professional development.

**Teaching Methodology:**

In the Classroom: Lectures make use of whiteboards, flipcharts, overhead projector, video material and power point presentations. Students are supplied with handouts on extra or relevant material. One Personal Computer Labs

equipped with Multimedia PCs of the latest technology with the required software, scanners, printers and LCD-Projectors, satisfy the classes' requirements. All PCs are connected to the Internet, through a Broad Band High speed permanent connection using cable technology.

Web Supported Learning: All the teaching material and the Lecturer's presentations are uploaded on the electronic learning platform of the college as a supporting studying tool.

Guest Speakers / Visits: External visits to agencies or relevant industry/subject related organizations are arranged. Guest speakers that are experts in their field are invited to address the students. Students are also encouraged to visit industry players and familiarize themselves with the profession they have chosen.

Teaching Methods: Lectures, presentations, videos, problem and case study discussion, discussion on relevant articles, independent and private study, preparation of projects, fieldwork and group work.

### Course Content

- **Introduction to Research**: What is research. Knowledge. Theory. Originality. Investigation. Research process models. Intellectual discovery. Scientific method. Problem solving. Classifying research.
- **Research Methods in Computing**: Analytical and empirical methods, surveys, case studies, controlled experiments, ethnography and action research, quantitative, qualitative and mixed methods, choosing research methods, validity threats.
- **Empirical Research Frameworks**
- **Research Problems**: Literature sources, databases, search engines, publishers, literature reviews, examples, queries.
- **Quantitative Research**: Study designs, controlled experiments, elements and methods, example experiments.
- **Data Collection Techniques**: Analysis and interpretation of quantitative data descriptive statistics,
- **Sampling**: sampling distribution, parameter estimation, statistical inference, confidence interval and hypothesis testing.
- **Tests**: Tests of significance, test of difference of mean and proportions, t-tests, ANOVA, Chi-square tests, correlation and regression.
- **Reviewing**: Review process, review guidelines, validity threats, review decisions.
- **Qualitative Methods**: Study designs, elements, and methods, the nature and types of qualitative research.
- **Data Collection Methods**: primary and secondary sources, types of data analysis methods.
- **Survey Research**: Sampling methods, survey study designs, case studies.
- **Mixed Methods Research**: Study designs and method,
- **Research Papers Publication**: purpose, nature and evaluation, content and format, research presentations. The art of scientific writing.
- **Essay on Software Engineering Research**: one of the two essays' topic is relevant to the software process and continuous quality improvement. Capability Maturity Model Integration (CMMI). A continuous quality framework for the software testing process within traditionally structured and unstructured environments. This framework aids in creating meaningful test cases for systems with evolving requirements. The students can use either industrial or research (Examiner's) Computing systems for performing their research analysis.

## Assessment Method

The final course grade is made up of:

2000 word essay on a Software Engineering topic by the examiner

5000 word essay on an agreed topic

The 2000 word essay marks on a Software Engineering research topic provided by the Examiner or the industrial contacts of the Examiner constitute 20% of the final semester mark. The 5000 word essay marks on a subject agreed between the student and examiner account for the 80% of the final semester mark.

The pass mark is set at 50%.

## Required Textbooks/Reading:

Required Bibliography:

Title	Author(s)	Publisher	Year
Projects in Computing and Information Systems: A Student's Guide	Christian Dawson	Pearson Higher Education	2015
Research Design: Qualitative, Quantitative, and Mixed Methods Approaches	John W. Creswell J. David Creswell	SAGE Publications	2018
Software Testing and Continuous Quality Improvement	William E. Lewis	Auerbach Publications	2017

Recommended Further Bibliography:

Title	Author(s)	Publisher	Year
Writing for Computer Science	Justin Zobel	Springer	2015
The Handbook of Technical Writing	Gerald J Alred	Bedford Books	2018
Ethical and Secure Computing: A Concise Module	Joseph Migga Kizza	Springer	2019
Ethical and Social Issues in the Information Age	Joseph Migga Kizza	Springer	2017
Computer Science Education Research	Sally Fincher and Marian Petre	Taylor & Francis	2014
Introduction to Software Process Improvement	Gerard O'Regan	Springer	2011