

## Comprehensive S.T.E.A.R Internship Plan – General Plan

### Serageldin Institute for Multidisciplinary Advanced Research (SIMAR), Bibliotheca Alexandrina

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#### Objective

To equip recent graduates with the analytical skills, research writing abilities, and publication processes necessary to excel in data analysis and academic research, and to cultivate a new generation of researchers capable of using advanced data analysis tools and techniques and producing publications of the highest quality standards. The program utilizes peer instruction, where interns periodically teach the new concepts that they have learnt to one another to deepen understanding and foster knowledge exchange. It is essential for interns to attend all sessions and engage fully in both group and individual activities to ensure that the program's objectives are met.

#### Duration

5 – 6 weeks

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#### Week 1 | Welcome & Introduction

1. **Programme overview** – schedule, objectives, expectations, code of conduct.
  2. **Guided tour** – Bibliotheca Alexandrina libraries & museums, research centres, and HPC resources.
  3. **Sector briefings** – functions and flagship projects of each department.
  4. **Group discussion** – interns' academic backgrounds, existing methodologies, and career goals.
  5. **Showcase of SIMAR publications** and paper selection for summaries.
  6. **Task1:** Summarizing the research paper selected for each intern.
  7. **One-to-one feedback** on summary drafts (writing quality, clarity, academic tone).
  8. **Task 2:** Intern presentations on the summarized papers and their methodologies.
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#### Week 2 | Introduction to Data Analysis

##### Topic 1 – Fundamentals

- Definition and importance of data analysis in research.
- The data-analysis cycle: collection ▶ cleaning ▶ analysis ▶ interpretation.
- Role of visualization; chart types: bar, histogram, scatter, line.
- Hands-on sessions with **Excel** and **Power BI**.
- Visual storytelling techniques.
- **Task 3:** Case-study exercise linking analytical choices to research questions.

## Topic 2 – Descriptive Statistics

- Central-tendency measures: mean, median, mode.
- Dispersion measures: variance, standard deviation, range.
- Practical calculation and interpretation with sample datasets.
- **Task 4:** Apply descriptive statistics to a real-world dataset.

## Topic 3 – Peer Instruction

- **Task 5:** Mini-lectures in which each intern teaches one analytical concept to peers.

## Topic 4 – Software Proficiency

### 4.a. Stata & Excel

- Importing, cleaning, and reshaping data.
- Pivot tables, data-validation, and formula auditing.
- Linear-regression modelling and diagnostics (multicollinearity, heteroskedasticity, autocorrelation).
- Real-world examples of Stata and Excel in practice.

### 4.b. R & Python

- Core syntax and data structures.
- Data-wrangling with **dplyr** and **pandas**.
- Multiple regression, econometric extensions, machine learning and simulation.
- Automating analysis with scripts; solving complex analytical problems.

### 4.c. SmartPLS

- Survey-analysis workflow: project setup, data import, measurement-model assessment.

#### 4.d. SQL

- Relational-database foundations: tables, primary & foreign keys, normalization.
  - Core query syntax: SELECT, WHERE, JOIN, GROUP BY, ORDER BY, sub-queries.
  - Aggregate functions, window functions, and data manipulation (INSERT, UPDATE, DELETE).
  - Exporting query results to Stata/R/Python and visualization tools.
  - Hands-on practice using PostgreSQL with research datasets.
  - Best practices for query optimization and database security.
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### Week 3 | Writing & Publishing Research Papers

#### Topic 1 – Paper Structure

- Standard sections: abstract, introduction, literature review, data sources, methodology, results, discussion, conclusion, references, appendix.
- Hallmarks of clear, concise academic prose; frequent writing pitfalls.

#### Topic 2 – Literature Search & Review

- Efficient database searching; evaluating source quality and relevance.
- Summarizing and synthesizing existing scholarship.

#### Topic 3 – Journal Selection & Submission

- Impact factors, indexing services, and scope alignment.
- Preparing a complete submission package (cover letter, annotations, reusable data/code).

#### Topic 4 – Peer-Review Process

- Understanding the peer review process and its importance.
  - Crafting constructive responses to reviewers' comments and revise your paper.
  - Tips for effectively communicating with journal editors.
  - Navigating rejection and resubmission.
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### Weeks 4 – 5 | Collaborative Research Projects

#### Project Planning & Design

- Team formation and topic selection.
- Developing project timelines and milestones.
- Identifying data sources and resource needs.

### **Data Collection & Analysis**

- Gathering, cleaning, and analyzing datasets.
- Scheduled progress reviews and troubleshooting sessions.

### **Report Writing & Presentation Preparation**

- Drafting full research papers and designing visual aids.
- Peer-review cycles and iterative refinements.
- Rehearsal of final presentations.

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## **Week 6 | Presentations & Certification**

### **Topic 1 – Group Presentations**

- Delivery of findings to peers, mentors, and invited experts.
- Structured feedback on analytical depth, clarity, and delivery; documentation of comments for future improvements.

### **Topic 2 – Certification Ceremony**

- Award of completion certificates.
- Closing remarks, networking, and programme reflection.

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## **Evaluation Framework**

- **Continuous assessment** through weekly practical tasks and immediate feedback.
- **Final project grading** emphasizing methodological rigor, analytical insight, and presentation quality.
- **Feedback loops** for interns and coordinators to refine the programme.