STANDARD OPERATING PROCEDURE (SOP)
GIS LABORATORY

PREARED BY,	REVIEWED BY,	AUTHORIZED BY,
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1. PROFILE

The Geographic Information Systems (GIS) Laboratory is an integral academic facility of the Department of Geography, Faculty of Social Sciences, Universitas Negeri Padang. The laboratory is established to support educational, research, community engagement, and professional development activities in the fields of Geographic Information Systems (GIS), Remote Sensing, Cartography, Spatial Analysis, and Geospatial Technology.

The rapid advancement of geospatial technologies and digital mapping applications has significantly increased the demand for laboratory facilities capable of supporting practical learning and scientific research. As a computer-based laboratory, the GIS Laboratory provides a modern learning environment equipped with specialized hardware, licensed software, and supporting infrastructure that enable students and lecturers to develop technical competencies in geospatial data acquisition, management, analysis, visualization, and interpretation.

The laboratory currently consists of twenty-nine (29) student workstations and one (1) operator workstation connected through a local network environment. Each workstation is equipped with licensed geospatial software, including ArcGIS and ENVI, which are utilized for practical courses, academic research, final projects, scientific publications, and community service activities.

To ensure that laboratory facilities are utilized efficiently, safely, and responsibly, standardized operating procedures are essential. These procedures establish a consistent framework for laboratory management, equipment utilization, software administration, preventive maintenance, occupational health and safety practices, documentation, and quality assurance.

2. PORTOFOLIO

Laboratory Profile

Laboratory Name : GIS (Geographic Information System) Laboratory
Department Geography
Faculty of Social Sciences
Universitas Negeri Padang

Study Programs : 1. Bachelor Degree of Education Geography (S1)
2. Bachelor Degree of Geography (S1)

Head of Laboratory : Dr. Triyatno, S.Pd., M.Si.
Laboratory Manager/Technician : -
Jabatan : Laboratory Technician

Laboratory Facilities

No	Room Name	Dimensions	Area (m^2)	Description
1	Practical Room	8.5 x 6 m	51 m^2	Available at: https://bit.ly/RuanganLabGeoFisik
2	Operator Room	5.5 x 3 m	16.5 m^2	
	Total Area		**67.65 m^2**	

3. STANDARD OPERATING PROCEDURE (SOP)

INTRODUCTION

1.1 Background

The Geographic Information Systems (GIS) Laboratory is an integral academic facility of the Department of Geography, Faculty of Social Sciences, Universitas Negeri Padang. The laboratory is established to support educational, research, community engagement, and professional development activities in the fields of Geographic Information Systems (GIS), Remote Sensing, Cartography, Spatial Analysis, and Geospatial Technology.

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1.2 Purpose

This Standard Operating Procedures (SOP) Manual is designed to establish standardized operational guidelines for the management and utilization of the Geographic Information Systems Laboratory.

The objectives of this manual are to:

1. standardize laboratory management procedures and operational practices;
2. ensure the effective, efficient, and responsible utilization of laboratory facilities and resources;
3. provide a safe, organized, and productive learning environment for all laboratory users;
4. maintain the functionality, reliability, and availability of computer hardware, software, and supporting infrastructure;
5. support practical courses, research activities, community service programs, professional training, and scientific innovation;
6. establish responsibilities and authorities for laboratory personnel and users;
7. protect institutional data, software licenses, and laboratory assets through standardized management procedures;
8. implement preventive maintenance programs to improve equipment performance and service life; and
9. promote continuous quality improvement in laboratory services in accordance with institutional quality assurance policies.

1.3 Scope

This SOP applies to all academic and administrative activities conducted within the Geographic Information Systems Laboratory of the Department of Geography, Faculty of Social Sciences, Universitas Negeri Padang.

The procedures described in this manual apply to:

- undergraduate students;
- postgraduate students;
- lecturers;
- researchers;
- laboratory assistants;
- laboratory coordinators;
- laboratory administrators;
- technical personnel; and
- authorized external users participating in official academic or professional activities.

The SOP covers laboratory operations including:

- laboratory access and utilization;
- practical teaching activities;
- computer operation;
- software utilization;
- data management;
- laboratory scheduling;
- equipment maintenance;
- occupational health, safety, and environmental practices (OHSE);
- emergency response procedures;
- documentation and record management; and
- laboratory quality assurance activities.

1.4 Vision

To become a modern, innovative, and internationally recognized Geographic Information Systems Laboratory that supports excellence in education, research, community engagement, and geospatial technology development.

1.5 Mission

The GIS Laboratory is committed to:

1. providing high-quality laboratory services that support academic excellence;
2. facilitating practical learning experiences using current geospatial technologies and industry-standard software;
3. supporting multidisciplinary research and scientific innovation in geographic information systems and remote sensing;
4. promoting responsible, ethical, and professional laboratory practices;
5. maintaining laboratory facilities through effective management and continuous improvement; and
6. developing students' technical competencies and professional skills to meet national and international standards.

1.6 Laboratory Functions

The Geographic Information Systems Laboratory serves multiple academic and professional functions, including:

Educational Function

Providing facilities and technical support for laboratory practical sessions related to:

- Geographic Information Systems;
- Remote Sensing;
- Cartography;
- Spatial Analysis;
- Digital Mapping;
- Geospatial Database Management; and
- Geographic Information Science.

Research Function

Supporting lecturers and students in conducting research activities involving:

- spatial data processing;
- remote sensing image analysis;
- GIS modeling;
- environmental assessment;

- urban and regional planning;
- disaster management; and
- natural resource management.

Community Service Function

Providing laboratory facilities for training programs, workshops, certification programs, and community outreach activities related to geospatial technologies.

Professional Development Function

Facilitating competency development through practical exercises, seminars, and software-based training using industry-standard applications.

1.7 Laboratory Profile

Item	Description
Laboratory Name	Geographic Information Systems Laboratory
Department	Department of Geography
Faculty	Faculty of Social Sciences
Institution	Universitas Negeri Padang
Number of Student Workstations	29 Units
Number of Operator Workstations	1 Unit
Total Computers	30 Units
Primary Software	ArcGIS and ENVI
Main Activities	Practical Courses, Research, Training, Community Service

1.8 Quality Policy

The Geographic Information Systems Laboratory is committed to providing professional, reliable, and sustainable laboratory services through effective management of human resources, facilities, information technology, and quality assurance systems.

The laboratory continuously strives to:

- deliver high-quality academic support services;
- maintain laboratory equipment and software in optimal condition;
- comply with institutional regulations and quality assurance standards;
- promote safe and responsible laboratory practices;
- ensure user satisfaction through continuous service improvement; and
- support innovation and excellence in geospatial education and research.

1.9 Quality Objectives

To achieve its quality policy, the GIS Laboratory establishes the following measurable objectives:

Quality Indicator	Target
Computer Availability	≥ 98%
ArcGIS Software Availability	100%
ENVI Software Availability	100%
Laboratory Operational Readiness	≥ 98%
Preventive Maintenance Completion	100% per semester
User Satisfaction Level	≥ 90%
Laboratory Safety Compliance	100%
Equipment Damage Due to Negligence	0 Major Incidents

1.10 Guiding Principles

The management and operation of the GIS Laboratory shall be based on the following principles:

- Professionalism – Laboratory services shall be delivered with integrity, competence, and accountability.
- Quality – Laboratory activities shall follow standardized procedures and continuous improvement practices.
- Safety – Occupational Health, Safety, and Environment (OHSE) principles shall be integrated into all laboratory activities.

- Efficiency – Laboratory resources shall be utilized effectively to maximize academic and research outcomes.
- Innovation – The laboratory shall continuously adopt emerging geospatial technologies and best practices.
- Collaboration – The laboratory shall support interdisciplinary collaboration among students, lecturers, researchers, government agencies, and industry partners.

LABORATORY ORGANIZATION AND MANAGEMENT

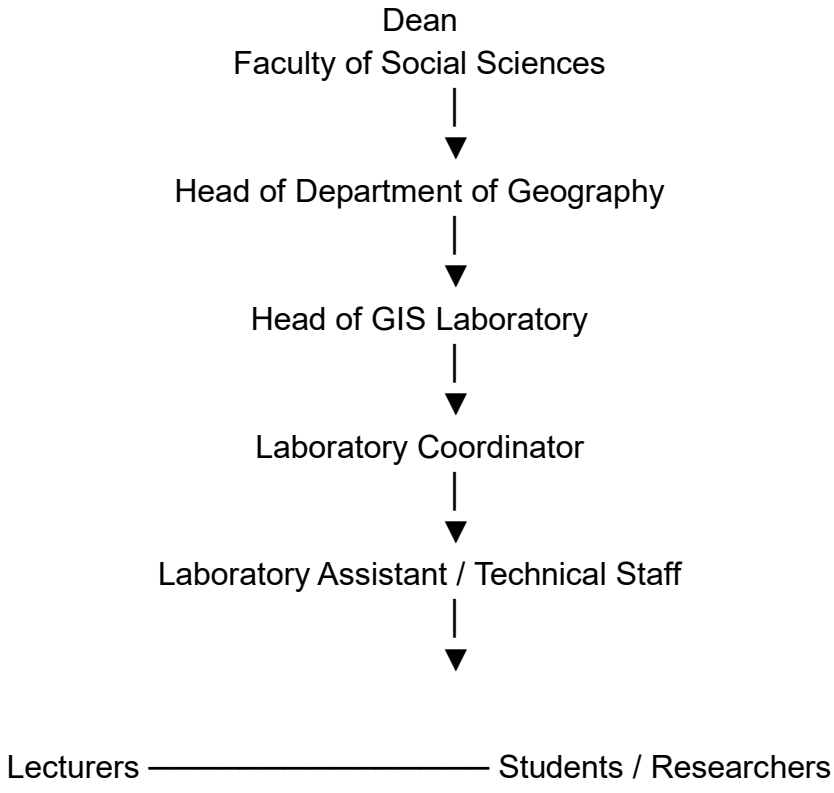
2.1 Purpose

This chapter establishes the organizational structure, management system, responsibilities, authority, and communication mechanisms of the Geographic Information Systems (GIS) Laboratory. It serves as a framework to ensure effective laboratory operations, quality assurance, resource management, and continuous improvement in support of academic and research activities.

2.2 Organizational Structure

The Geographic Information Systems (GIS) Laboratory operates under the Department of Geography, Faculty of Social Sciences, Universitas Negeri Padang.

The laboratory management structure is organized as follows:



Each organizational unit has specific duties and responsibilities to ensure the laboratory operates effectively, efficiently, and in accordance with institutional policies.

2.3 Organizational Responsibilities

2.3.1 Head of Department

The Head of the Department is responsible for providing strategic direction and institutional oversight for laboratory management.

Responsibilities

- Approve laboratory policies and annual work plans.
- Support laboratory development and resource allocation.
- Monitor laboratory performance and quality assurance implementation.
- Promote laboratory collaboration with external institutions and industry partners.
- Ensure compliance with university regulations.

2.3.2 Head of GIS Laboratory

The Head of the Laboratory is responsible for the overall management, administration, and development of laboratory operations.

Responsibilities

The Head of Laboratory shall:

- develop laboratory operational policies;
- supervise laboratory personnel;
- approve laboratory schedules and special activities;
- ensure laboratory facilities remain functional and available;
- monitor laboratory safety and security;
- coordinate equipment procurement and maintenance;
- evaluate laboratory performance;
- prepare annual laboratory reports; and
- implement continuous quality improvement programs.

Authority

The Head of Laboratory has the authority to:

- approve or reject laboratory use requests;
- authorize software installation and updates;
- determine laboratory operational priorities;
- suspend laboratory activities for safety or maintenance reasons.

2.3.3 Laboratory Coordinator

The Laboratory Coordinator is responsible for managing the daily operational activities of the laboratory.

Responsibilities

The Laboratory Coordinator shall:

- prepare laboratory schedules;
- coordinate practical sessions;
- supervise laboratory assistants;
- monitor equipment utilization;
- maintain inventory records;
- verify software functionality;
- coordinate preventive maintenance activities;
- prepare operational reports.

Administrative Responsibilities

The coordinator is also responsible for:

- attendance records;
- laboratory booking records;
- equipment loan documentation;
- maintenance documentation;
- software licensing documentation.

2.3.4 Laboratory Assistant

The Laboratory Assistant provides technical and operational support during laboratory activities.

Responsibilities

The Laboratory Assistant shall:

Before Practical Sessions

- unlock the laboratory;
- switch on electrical systems;
- inspect computer workstations;
- verify ArcGIS functionality;
- verify ENVI functionality;
- verify network connectivity;
- prepare teaching materials;
- ensure laboratory cleanliness.

During Practical Sessions

- assist lecturers;
- provide technical support;
- monitor laboratory activities;
- record equipment problems;
- maintain laboratory discipline.

After Practical Sessions

- inspect all computers;
- ensure software is properly closed;
- verify workstation conditions;
- shut down equipment;
- lock laboratory facilities.

2.3.5 Lecturers

Lecturers are responsible for supervising academic activities conducted within the laboratory.

Responsibilities

Lecturers shall:

- coordinate laboratory schedules;
- prepare practical modules;
- supervise students;
- ensure compliance with laboratory regulations;
- report equipment malfunctions;
- evaluate laboratory learning outcomes.

2.3.6 Students

Students are the primary users of the laboratory facilities.

Responsibilities

Students shall:

- comply with all laboratory regulations;
- occupy assigned workstations;
- maintain laboratory cleanliness;
- use licensed software responsibly;
- report equipment malfunctions immediately;
- protect laboratory equipment from damage;
- log out before leaving the laboratory.

Students shall not:

- install software;
- uninstall applications;
- modify operating system settings;
- disconnect network cables;
- change administrator configurations.

2.3.7 External Users

External users include researchers, government agencies, partner institutions, and community organizations authorized to use the laboratory.

External users shall:

- obtain written approval from the Head of Laboratory;
- comply with laboratory regulations;
- follow instructions from laboratory personnel;
- maintain laboratory facilities responsibly.

2.4 Laboratory Facilities

The Geographic Information Systems Laboratory provides facilities designed to support teaching, research, and professional training activities.

Computer Facilities

Equipment	Quantity
Student Workstations	29 Units
Operator Workstation	1 Unit
Total Computers	30 Units

Software Facilities

Licensed software installed in the laboratory includes:

Geographic Information Systems

- ArcGIS Desktop
- ArcMap
- ArcCatalog
- ArcToolbox

Remote Sensing

- ENVI

Supporting Applications

- Microsoft Office
- PDF Reader
- Internet Browser
- File Compression Utility
- Media Player

Supporting Infrastructure

The laboratory is equipped with:

- Local Area Network (LAN)
- High-Speed Internet Connection
- LCD Projector
- Air Conditioning System
- Whiteboard
- UPS and Power Protection System
- Printer (if available)
- Server or Shared Storage (if available)

2.5 Laboratory Capacity

The GIS Laboratory is designed to accommodate:

User Category	Capacity
Students	29 Persons
Lecturer	1 Person
Laboratory Assistant	1 Person
Maximum Occupancy	31 Persons

To maintain comfort and safety, the laboratory occupancy shall not exceed its designated capacity unless approved by the Head of Laboratory.

2.6 Communication and Coordination

Effective communication among laboratory personnel is essential for maintaining smooth laboratory operations.

Communication shall be conducted through:

- official letters;
- institutional email;
- laboratory information boards;

- official messaging groups;
- laboratory meetings.

Operational issues shall be reported immediately to the Laboratory Coordinator.

Major technical issues shall be escalated to the Head of Laboratory.

2.7 Laboratory Meetings

Routine laboratory meetings shall be conducted:

Meeting	Frequency
Operational Meeting	Monthly
Maintenance Meeting	Every Semester
Quality Evaluation Meeting	Every Semester
Annual Planning Meeting	Once per Year

Meeting minutes shall be documented and archived as official laboratory records.

2.8 Quality Management Principles

The management of the GIS Laboratory is based on the following principles:

Professionalism

All laboratory personnel shall perform their duties with competence, integrity, and accountability.

Transparency

Laboratory operations, scheduling, and documentation shall be accessible and clearly communicated to authorized users.

Efficiency

Laboratory resources shall be utilized effectively to maximize educational and research outcomes.

Continuous Improvement

Laboratory services, facilities, and procedures shall be regularly evaluated and improved.

User Satisfaction

Laboratory management shall continuously strive to provide high-quality services that meet user expectations.

2.9 Key Performance Indicators (KPIs)

The laboratory shall monitor operational performance using the following indicators:

Performance Indicator	Target
Computer Availability	≥ 98%
ArcGIS Operational Status	100%
ENVI Operational Status	100%
Network Availability	≥ 98%
Preventive Maintenance Completion	100%
Laboratory Schedule Compliance	≥ 95%
User Satisfaction	≥ 90%
Major Equipment Failure	0 Cases per Semester

2.10 Document Control

The following documents shall be maintained by the GIS Laboratory:

- Laboratory Organizational Structure
- Personnel Assignment Records
- Laboratory Schedule
- Equipment Inventory
- Software License Inventory
- Maintenance Records
- Meeting Minutes
- Annual Performance Reports
- User Attendance Records
- Laboratory Utilization Reports

All records shall be retained in accordance with the Department of Geography's document retention policy and shall be available for internal quality audits and accreditation purposes.

LABORATORY ORGANIZATION AND MANAGEMENT

3.1 Purpose

This chapter establishes the policies, regulations, and operational standards governing the management and utilization of the Geographic Information Systems (GIS) Laboratory. These policies are intended to ensure that laboratory facilities are used efficiently, safely, responsibly, and in accordance with institutional quality assurance standards.

The policies outlined in this chapter apply to all laboratory personnel, lecturers, students, researchers, visitors, and authorized external users.

3.2 General Policy

The Geographic Information Systems (GIS) Laboratory is an academic facility dedicated to supporting education, research, innovation, and community engagement in the fields of Geographic Information Systems, Remote Sensing, Cartography, Spatial Analysis, and Geospatial Technology.

All laboratory users shall comply with the policies and procedures established in this manual.

The laboratory shall be managed according to the principles of:

- Professionalism
- Accountability
- Transparency
- Quality Assurance
- Safety
- Continuous Improvement
- Sustainability

3.3 Laboratory Operational Policy

The laboratory shall primarily be used for:

- Undergraduate practical courses
- Postgraduate practical courses
- Academic research
- Final projects and theses

- Scientific publications
- Community engagement programs
- Professional training and workshops
- Official institutional activities

Any use of the laboratory outside these activities requires prior written approval from the Head of Laboratory.

3.4 Laboratory Operating Hours

The laboratory operates according to the official academic schedule established by the Department of Geography.

Day	Operating Hours
Monday	08:00 – 16:00 WIB
Tuesday	08:00 – 16:00 WIB
Wednesday	08:00 – 16:00 WIB
Thursday	08:00 – 16:00 WIB
Friday	08:00 – 16:00 WIB
Saturday	By Appointment
Sunday	Closed

The laboratory may remain open beyond normal operating hours only with approval from the Head of Laboratory.

3.5 Laboratory Access Policy

Access to the laboratory is restricted to authorized users.

Authorized users include:

- Lecturers
- Laboratory personnel
- Undergraduate students
- Postgraduate students
- Researchers
- Official visitors
- External collaborators with written permission

Unauthorized persons are prohibited from entering the laboratory.

3.6 User Registration Policy

All users shall register their attendance before entering the laboratory.

The attendance record shall include:

- Name
- Student or Employee Identification Number
- Date
- Time of Entry
- Time of Exit
- Purpose of Laboratory Use
- Signature

Electronic attendance systems may be implemented where available.

3.7 Computer Assignment Policy

The GIS Laboratory consists of:

Equipment	Quantity
Student Workstations	29 Units
Operator Workstation	1 Unit

Each student shall use only the workstation assigned by the Laboratory Assistant or Lecturer.

Students shall not exchange workstations without permission.

The operator workstation is reserved exclusively for:

- Lecturers
- Laboratory Coordinator
- Laboratory Assistant
- Authorized technical personnel

Students are strictly prohibited from using the operator workstation.

3.8 Software Usage Policy

All software installed in the laboratory is licensed for academic purposes.

Installed software includes:

Geographic Information Systems

- ArcGIS

Remote Sensing

- ENVI

Supporting Applications

- Microsoft Office
- PDF Reader
- Internet Browser
- File Compression Utility

Users shall:

- use software only for academic purposes;
- follow licensing agreements;
- save files in designated locations;
- properly close applications after use.

Users shall not:

- install unauthorized software;
- uninstall existing software;
- modify software configurations;
- alter licensing information;
- disable security features.

Violation of software policies may result in suspension of laboratory privileges.

3.9 Internet Usage Policy

Internet access is provided exclusively for academic activities.

Acceptable uses include:

- Literature searches

- Academic journals
- Online GIS resources
- Satellite imagery downloads
- Educational videos
- Institutional learning platforms

The following activities are prohibited:

- Streaming entertainment content
- Online gaming
- Downloading pirated software
- Accessing illegal websites
- Cryptocurrency mining
- Unauthorized file sharing

Internet activity may be monitored for security purposes.

3.10 Equipment Protection Policy

Laboratory equipment is institutional property and shall be maintained responsibly.

Users shall:

- inspect equipment before use;
- report damaged equipment immediately;
- maintain cleanliness;
- operate equipment according to instructions.

Users shall not:

- disconnect cables;
- relocate computers;
- remove peripherals;
- open computer cases;
- attach unauthorized devices.

Users may be held financially responsible for damage resulting from negligence or misuse.

3.11 Laboratory Cleanliness Policy

Every laboratory user shares responsibility for maintaining a clean and organized environment.

Users shall:

- keep workstations tidy;
- dispose of waste properly;
- arrange chairs after use;
- maintain cleanliness of desks and equipment.

The laboratory shall be cleaned regularly by authorized personnel.

3.12 Food and Beverage Policy

To protect laboratory equipment and maintain cleanliness:

The following are prohibited inside the laboratory:

- Food
- Coffee
- Tea
- Soft drinks
- Bottled beverages without secure lids
- Chewing gum

Exceptions may be granted only during officially approved events.

3.13 Occupational Health and Safety Policy

The laboratory shall provide a safe learning environment.

Users shall:

- maintain ergonomic posture;
- avoid touching electrical equipment with wet hands;
- report damaged electrical components;
- follow emergency procedures.

Emergency exits shall remain unobstructed at all times.

3.14 Security Policy

Laboratory security is a shared responsibility.

Security measures include:

- controlled access;
- attendance verification;
- administrator account protection;
- CCTV monitoring (where available);
- equipment inventory control;
- software license management.

Only authorized personnel may access:

- Operator Workstation
- Administrator Accounts
- Network Configuration
- Software License Manager

3.15 Environmental Sustainability Policy

The GIS Laboratory is committed to environmentally responsible operations.

Users are encouraged to:

- minimize paper usage;
- utilize digital submissions;
- switch off monitors when not in use;
- conserve electricity;
- reduce unnecessary printing.

Laboratory personnel shall implement energy-efficient operational practices whenever possible.

3.16 Policy Violations

Violations of laboratory policies may result in disciplinary actions depending on the severity of the offense.

Possible sanctions include:

Level	Action
Minor Violation	Verbal Warning
Repeated Minor Violation	Written Warning
Major Violation	Temporary Suspension of Laboratory Access
Severe Misconduct	Report to Department and Faculty Authorities

Examples of major violations include:

- Installing unauthorized software
- Damaging laboratory equipment
- Unauthorized access to administrator accounts
- Data manipulation or deletion
- Intentional misuse of laboratory facilities

LABORATORY ACCESS AND PRACTICAL SESSION PROCEDURES

5.1 Purpose

This chapter establishes standardized procedures for accessing and utilizing the Geographic Information Systems (GIS) Laboratory for academic instruction, practical sessions, research activities, workshops, and other authorized programs.

These procedures are designed to ensure that laboratory facilities are managed efficiently, laboratory resources are protected, and all users are provided with a safe, organized, and productive learning environment.

5.2 Scope

This procedure applies to:

- Undergraduate students
- Postgraduate students
- Lecturers
- Laboratory Assistants
- Laboratory Coordinators
- Researchers
- Authorized external users

5.3 Laboratory Access Authorization

Access to the GIS Laboratory shall be granted only to authorized users.

Authorized users include:

- Students enrolled in GIS-related courses
- Lecturers conducting laboratory sessions
- Laboratory personnel
- Researchers with official approval
- External collaborators authorized by the Department

Unauthorized persons are prohibited from entering the laboratory.

5.4 Laboratory Reservation Procedure

A. Regular Practical Sessions

Regular practical classes follow the official academic timetable approved by the Department of Geography.

No additional reservation is required.

B. Research Activities

Students or lecturers wishing to use the laboratory outside scheduled classes shall submit a reservation request to the Laboratory Coordinator at least one (1) working day in advance.

The request shall include:

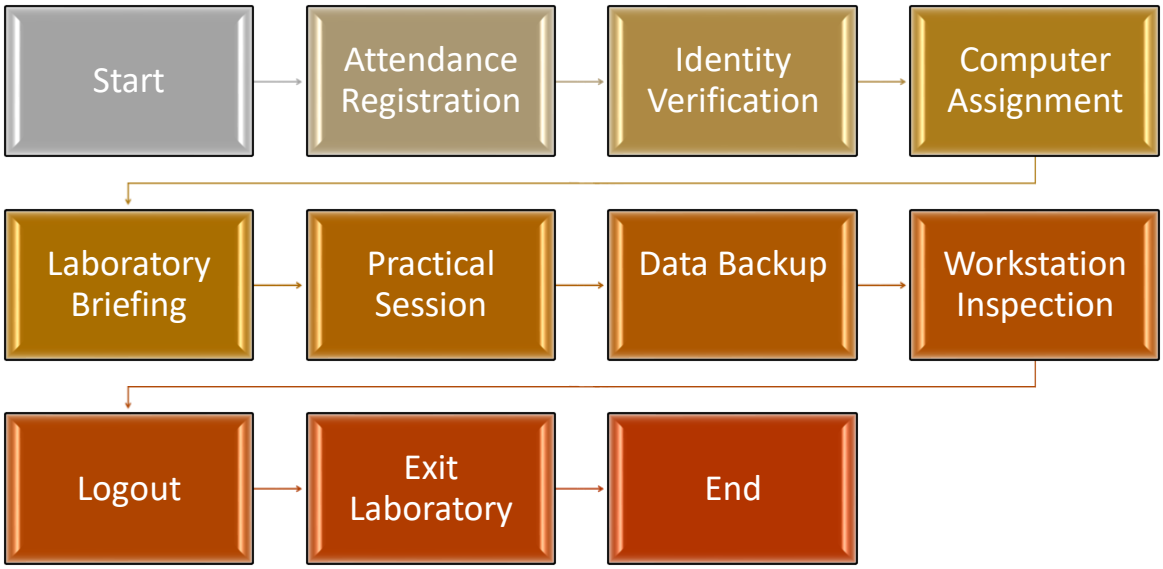
- Name
- Student/Employee ID
- Department
- Purpose of use
- Date
- Time
- Number of participants
- Required software

C. Workshops and Training Programs

Reservations for workshops, seminars, or training sessions shall be submitted at least seven (7) working days before the event.

Approval shall be granted by the Head of Laboratory.

5.5 Laboratory Access Flow



5.6 Pre-Practical Session Procedure

The Laboratory Assistant shall complete the following activities before each practical session.

A. Laboratory Preparation

- Unlock laboratory doors
- Switch on lighting and air conditioning
- Inspect laboratory cleanliness
- Ensure emergency exits are accessible

B. Computer Inspection

Verify that:

- all 29 student workstations are operational;
- the operator workstation is functioning properly;
- keyboards and mice are connected;
- monitors are operational;
- power cables are secure.

C. Software Verification

Confirm that the following software operates correctly:

GIS Software

- ArcGIS

Remote Sensing Software

- ENVI

Supporting Software

- Microsoft Office
- PDF Reader
- Internet Browser

D. Network Verification

Check:

- Local Area Network (LAN)
- Internet connection
- Shared storage access (if available)

E. Teaching Materials

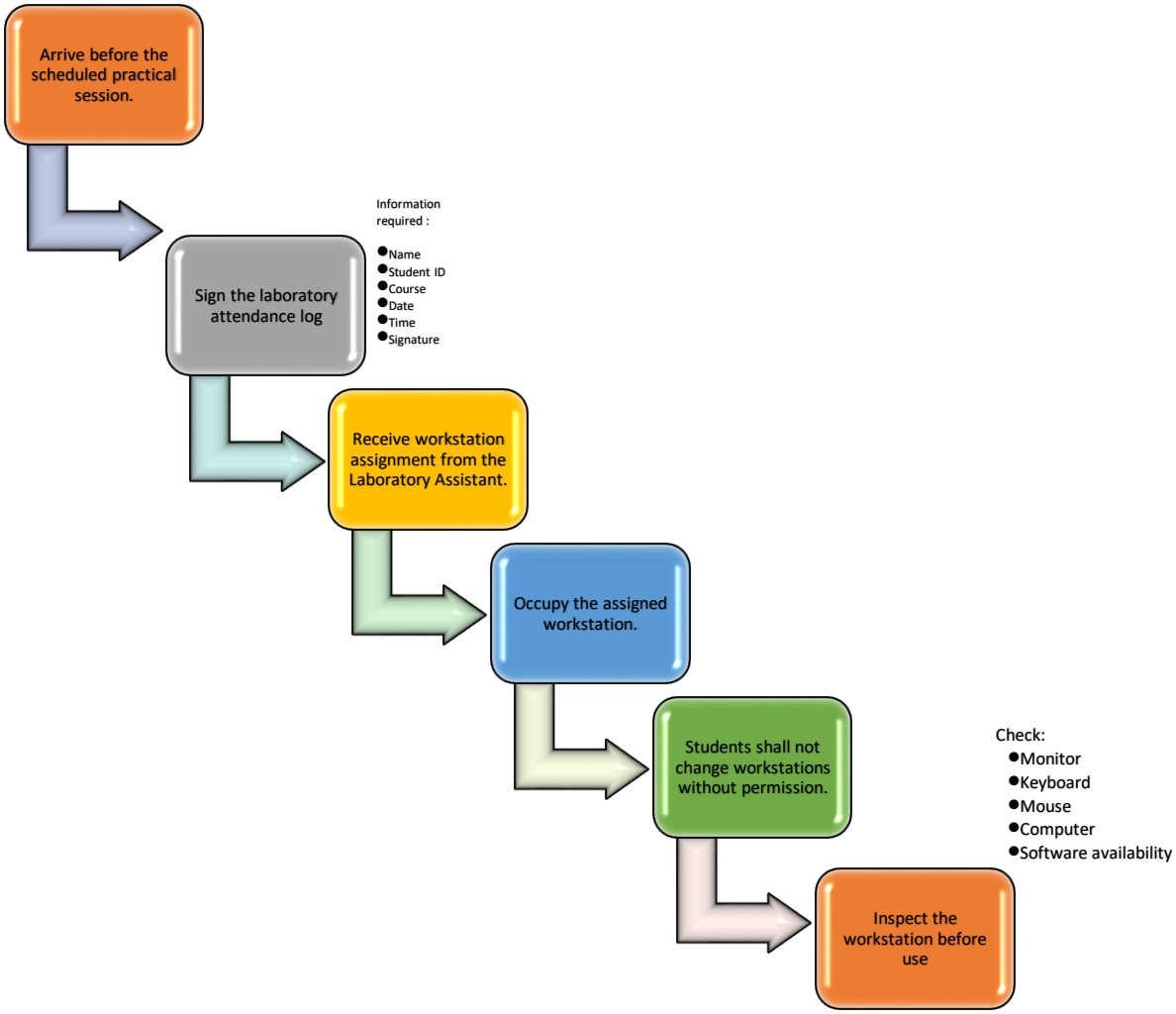
Prepare:

- Practical modules

- Sample datasets
- Satellite imagery
- GIS project files

5.7 Student Entry Procedure

Students shall:



5.8 Practical Session Procedure

Beginning of Session

The Lecturer shall:

- explain learning objectives;
- introduce practical activities;

- explain safety procedures;
- provide instructions for software usage.

During the Session

Students shall:

- use only assigned computers;
- follow lecturer instructions;
- save files appropriately;
- maintain laboratory discipline.

Students shall not:

- install software;
- modify operating system settings;
- disconnect cables;
- remove peripherals.

Operator Workstation

The operator workstation shall be used exclusively by:

- Lecturer
- Laboratory Coordinator
- Laboratory Assistant

Students are prohibited from accessing the operator workstation.

5.9 GIS Software Usage Procedure

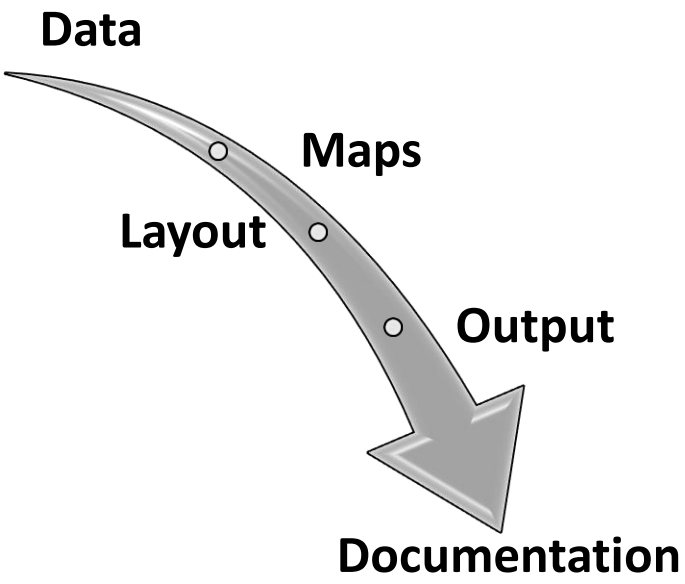
ArcGIS

Students shall:

- create project folders;
- organize geodatabases properly;
- save projects periodically;
- close all projects before logout.

Recommended folder structure:

GIS_Practicum



ENVI

Students shall:

- preserve original raster datasets;
- save processed images separately;
- document image processing workflows.

Output folders shall include:

5.10 File Management Procedure

Users shall save files using the following naming convention:

StudentID_Name_Course_Practicum

Example:

2310523010_Ahmad_GIS_SpatialAnalysis

Temporary files should be removed after practical sessions.

Important files shall be backed up before logout.

5.11 Internet Usage During Practical Sessions

Internet access may be used for:

- downloading satellite imagery;
- accessing online GIS resources;
- literature searches;
- accessing institutional learning platforms.

Users shall not:

- stream entertainment videos;
- download illegal software;
- access unauthorized websites.

5.12 End-of-Session Procedure

Before leaving the laboratory, students shall:

Software

✓ Save all files

✓ Close ArcGIS

✓ Close ENVI

✓ Close Microsoft Office

Computer

✓ Logout

✓ Shutdown computer (if instructed)

Workstation

✓ Arrange keyboard

✓ Arrange mouse

✓ Organize chair

✓ Clean desk

Personal Files

✓ Remove temporary files

✓ Backup important documents

5.13 Laboratory Exit Procedure

Students shall:

1. Ensure workstation is clean.
2. Return borrowed accessories (if any).
3. Sign laboratory exit log (if applicable).
4. Leave the laboratory quietly.

5.14 Laboratory Capacity Management

The GIS Laboratory has:

Facility	Capacity
Student Workstations	29
Operator Workstation	1

Facility	Capacity
Maximum Student Capacity	29
Lecturer Capacity	1
Total Recommended Occupancy	30 Persons

Laboratory occupancy shall not exceed its designed capacity without approval from the Head of Laboratory.

5.15 Responsibilities

Head of Laboratory

- Approve laboratory schedules.
- Supervise implementation of access procedures.
- Evaluate laboratory utilization.

Laboratory Coordinator

- Manage reservations.
- Prepare schedules.
- Monitor laboratory activities.

Laboratory Assistant

- Prepare computers.
- Verify software functionality.
- Record attendance.
- Provide technical assistance.

Lecturer

- Supervise practical sessions.
- Ensure compliance with SOP.
- Evaluate learning activities.

Students

Students shall:

- comply with laboratory regulations;
- use facilities responsibly;
- maintain workstation cleanliness;
- report technical issues immediately.

5.16 Key Performance Indicators (KPIs)

Indicator	Target
Laboratory Readiness Before Class	100%
Computer Availability	≥98%
ArcGIS Availability	100%
ENVI Availability	100%
Practical Session Starts on Time	≥95%
Attendance Documentation Accuracy	100%
Laboratory Cleanliness After Session	≥95%
User Satisfaction	≥90%

5.17 Documentation and Records

The following records shall be maintained:

Document	Retention Period
Laboratory Attendance Log	5 Years
Laboratory Reservation Form	5 Years
Practical Session Schedule	5 Years
Computer Usage Log	5 Years
Incident Report	5 Years
Visitor Log	5 Years

5.18 Continuous Improvement

Laboratory access procedures shall be reviewed annually or whenever there are significant changes to:

- laboratory infrastructure;
- software systems;

- university policies;
- occupational health and safety regulations; or
- quality assurance requirements.

Recommendations from lecturers, students, and laboratory personnel shall be documented and incorporated into future revisions to enhance the efficiency, accessibility, and quality of GIS laboratory services.

GIS PRACTICAL SESSION MANAGEMENT PROCEDURES

6.1 Purpose

This chapter establishes standardized procedures for planning, preparing, implementing, supervising, and evaluating practical sessions conducted in the Geographic Information Systems (GIS) Laboratory.

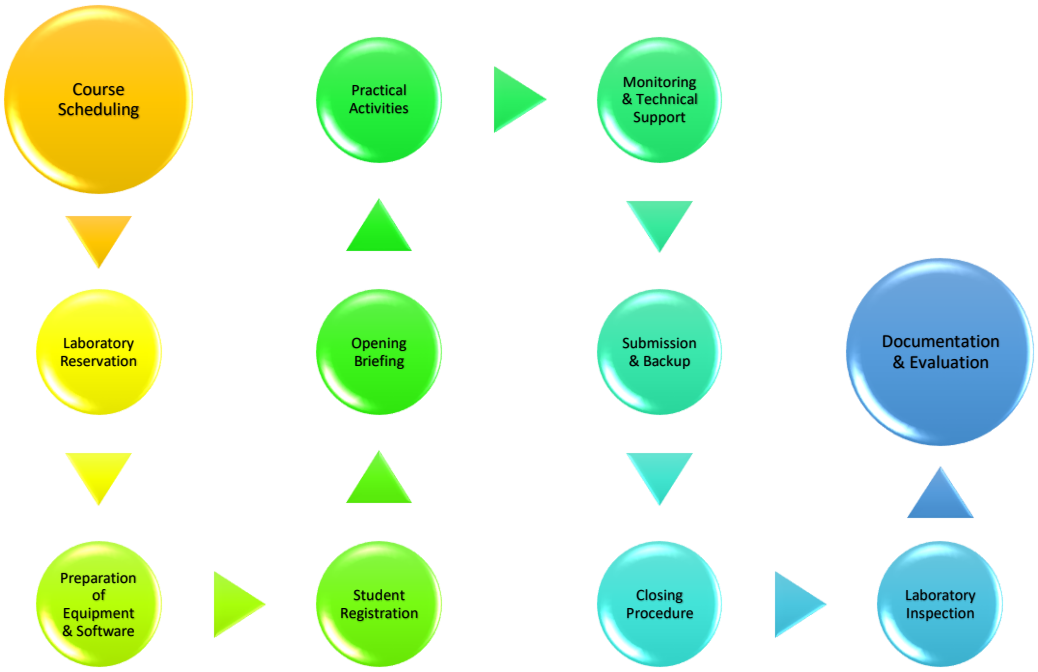
The procedures are designed to ensure that every practical session is conducted efficiently, safely, consistently, and in accordance with academic standards while maximizing the utilization of laboratory facilities and licensed geospatial software.

6.2 Scope

This procedure applies to:

- Undergraduate practical courses
- Postgraduate practical courses
- Laboratory-based tutorials
- Independent laboratory practice
- Research-based practical activities
- Workshops and training programs conducted in the GIS Laboratory

6.3 Practical Session Workflow



6.4 Planning Phase

6.4.1 Practical Schedule

Practical sessions shall follow the official academic timetable issued by the Department of Geography.

Any schedule modification shall be approved by:

- Course Lecturer
- Laboratory Coordinator
- Head of Laboratory

6.4.2 Practical Module Preparation

Before the semester begins, each lecturer shall prepare:

- Course syllabus
- Practical module
- Learning outcomes
- Assessment criteria
- GIS datasets

- Remote sensing imagery
- Supporting references

All materials shall be submitted to the Laboratory Coordinator before the first practical session.

6.5 Laboratory Preparation

The Laboratory Assistant shall prepare the laboratory at least 30 minutes before the practical session begins.

6.5.1 Facility Inspection

The following facilities shall be inspected:

Item	Status
Laboratory Cleanliness	□
Lighting System	□
Air Conditioning	□
Projector	□
Whiteboard	□
Internet Connection	□

6.5.2 Computer Inspection

Every workstation shall be inspected.

Inspection includes:

- CPU
- Monitor
- Keyboard
- Mouse
- Network connection
- Power supply

Total workstations:

Equipment	Quantity
Student Workstations	29
Operator Workstation	1

6.5.3 Software Verification

The Laboratory Assistant shall verify that the following applications are functioning correctly:

GIS Software

- ArcGIS

Remote Sensing Software

- ENVI

Supporting Applications

- Microsoft Office
- PDF Reader
- Web Browser

6.5.4 Data Preparation

The Laboratory Assistant shall prepare:

- GIS datasets
- Satellite imagery
- Base maps
- Project templates
- Exercise files

Data shall be copied to designated laboratory folders before the session begins.

6.6 Student Registration Procedure

Students shall:

1. Arrive before the scheduled session.
2. Register attendance.
3. Receive workstation assignment.
4. Prepare practical materials.
5. Wait for instructions from the lecturer.

Attendance information shall include:

- Name
- Student ID
- Course
- Date
- Time In
- Signature

6.7 Opening Session

The Lecturer shall begin the practical session by explaining:

- learning objectives;
- practical activities;
- expected outputs;
- assessment methods;
- laboratory safety reminders.

Students may ask questions before practical activities begin.

6.8 Practical Implementation

Students shall perform practical activities according to the practical module.

Typical activities include:

Geographic Information Systems

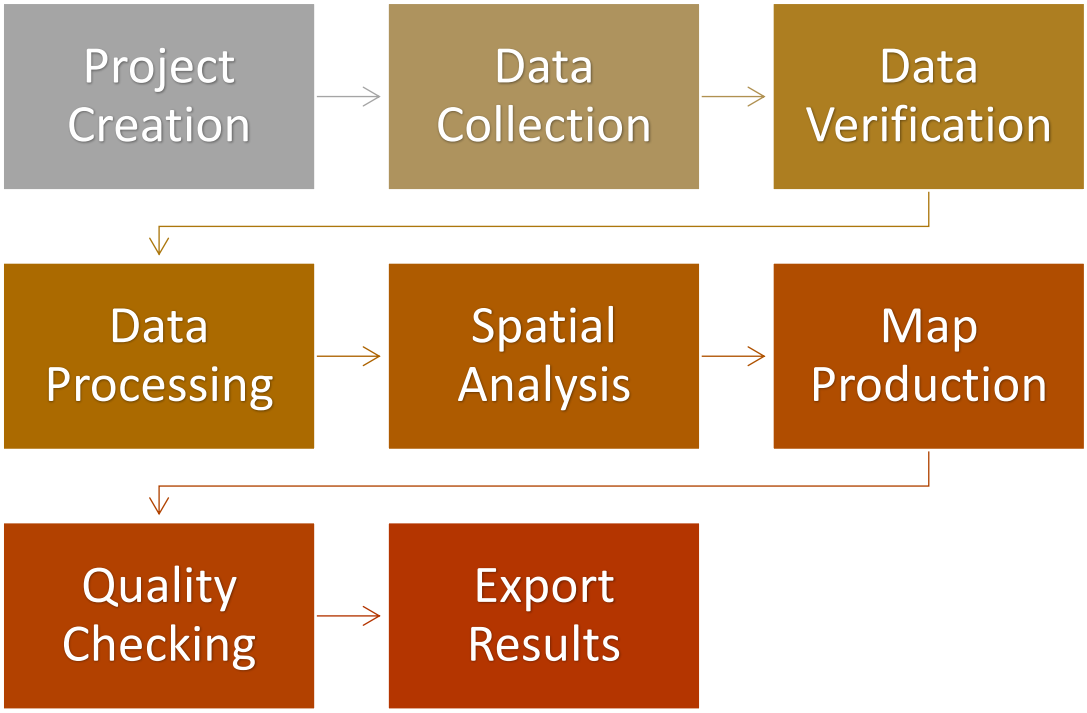
- Data input
- Georeferencing
- Digitizing
- Spatial database creation
- Attribute editing
- Spatial analysis
- Cartographic visualization

- Layout design

Remote Sensing

- Image preprocessing
- Image enhancement
- Image classification
- Raster analysis
- Change detection
- Accuracy assessment

6.9 Standard GIS Workflow



6.10 Student Responsibilities During Practical Sessions

Students shall:

✓ Follow lecturer instructions.

✓ Use only assigned computers.

✓ Save files periodically.

✓ Maintain laboratory cleanliness.

✓ Report software errors immediately.

✓ Respect laboratory equipment.

Students shall not:

✗ Install software.

✗ Modify system settings.

✗ Disconnect hardware.

✗ Access administrator accounts.

✗ Delete shared laboratory files.

6.11 Lecturer Responsibilities

The Lecturer shall:

- supervise practical activities;
- explain practical procedures;
- provide technical guidance;
- monitor student participation;
- ensure laboratory discipline;
- evaluate practical performance.

6.12 Laboratory Assistant Responsibilities

The Laboratory Assistant shall:

Before Practical Sessions

- prepare computers;
- verify ArcGIS;
- verify ENVI;
- prepare datasets;
- prepare projector.

During Practical Sessions

- provide technical assistance;
- monitor laboratory conditions;
- record technical problems;
- support lecturers.

After Practical Sessions

- inspect workstations;
- verify software closure;
- shut down laboratory equipment;
- document laboratory conditions.

6.13 File Management Procedure

Students shall create folders using the following format:

StudentID_Name_Course

Example:

2310523010_Ahmad_GIS_Practicum

Folder structure:

GIS_Practicum

```
├── Data
├── Raster
├── Vector
├── Layout
├── Output
├── Report
└── Backup
```

6.14 Saving and Backup Procedure

Students shall save their work:

- every 15 minutes;
- before running large analyses;
- before printing;

- before logout.

Important files shall be backed up to:

- personal storage devices;
- cloud storage;
- university storage (if available).

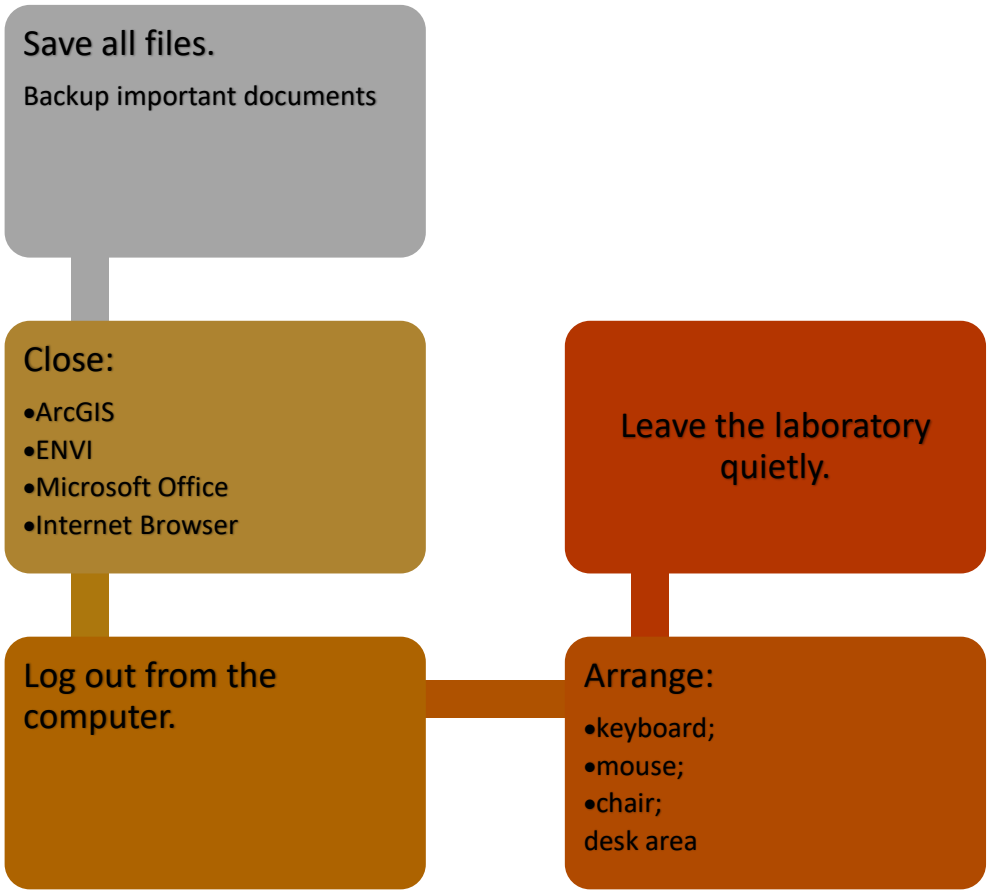
6.15 Practical Assessment

Student performance may be evaluated based on:

Assessment Component	Percentage
Attendance	10%
Participation	15%
Practical Skills	35%
Map Output	20%
Report	20%

Assessment criteria may be adjusted according to course requirements.

6.16 End-of-Session Procedure



6.17 Practical Session Evaluation

After every practical session, the Lecturer and Laboratory Assistant shall evaluate:

- learning achievement;
- laboratory readiness;
- software performance;
- equipment functionality;
- student participation;
- technical problems encountered.

Recommendations shall be documented for future improvements.

6.18 Incident Management

Any incident occurring during practical activities shall be reported immediately.

Examples include:

- computer malfunction;
- ArcGIS software failure;
- ENVI licensing error;
- network disruption;
- electrical failure;
- accidental equipment damage.

An Incident Report Form shall be completed by the Laboratory Assistant.

6.19 Quality Indicators

Performance Indicator	Target
Practical Sessions Conducted as Scheduled	≥98%
Computer Availability	≥98%
ArcGIS Availability	100%
ENVI Availability	100%
Student Attendance	≥90%
Practical Completion Rate	≥95%
Technical Incident Resolution	≤15 Minutes
User Satisfaction	≥90%

6.20 Documentation

The following documents shall be maintained:

- Practical Session Schedule
- Attendance Log
- Laboratory Usage Log
- Incident Report
- Practical Assessment Record
- Laboratory Inspection Checklist
- Software Verification Checklist
- Equipment Condition Checklist

All records shall be retained for quality assurance, internal audits, and accreditation purpose.

COMPUTER, SOFTWARE, AND DATA MANAGEMENT PROCEDURES

7.1 Purpose

This chapter establishes standardized procedures for the operation, management, maintenance, and security of computer systems, software applications, and digital data within the Geographic Information Systems (GIS) Laboratory.

These procedures ensure that all laboratory computing resources are utilized efficiently, securely, and consistently while supporting teaching, research, community engagement, and professional development activities.

7.2 Scope

This chapter applies to:

- Laboratory Coordinator
- Laboratory Assistants
- Lecturers
- Students
- Researchers
- Technical Support Personnel
- Authorized External Users

The procedures cover:

- Computer operation
- Software management
- User account management
- Data storage
- Backup procedures
- Information security
- System maintenance
- License management

7.3 Laboratory Computing Resources

The GIS Laboratory is equipped with the following computing facilities:

Resource	Quantity
Student Workstations	29 Units
Operator Workstation	1 Unit
Total Computers	30 Units
Local Area Network (LAN)	Available
Internet Connection	Available

The operator workstation functions as the central management computer and shall only be accessed by authorized laboratory personnel.

7.4 Installed Software

The laboratory utilizes licensed software to support geospatial education and research.

7.4.1 Geographic Information Systems Software

- ArcGIS Desktop
- ArcMap
- ArcCatalog
- ArcToolbox

7.4.2 Remote Sensing Software

- ENVI

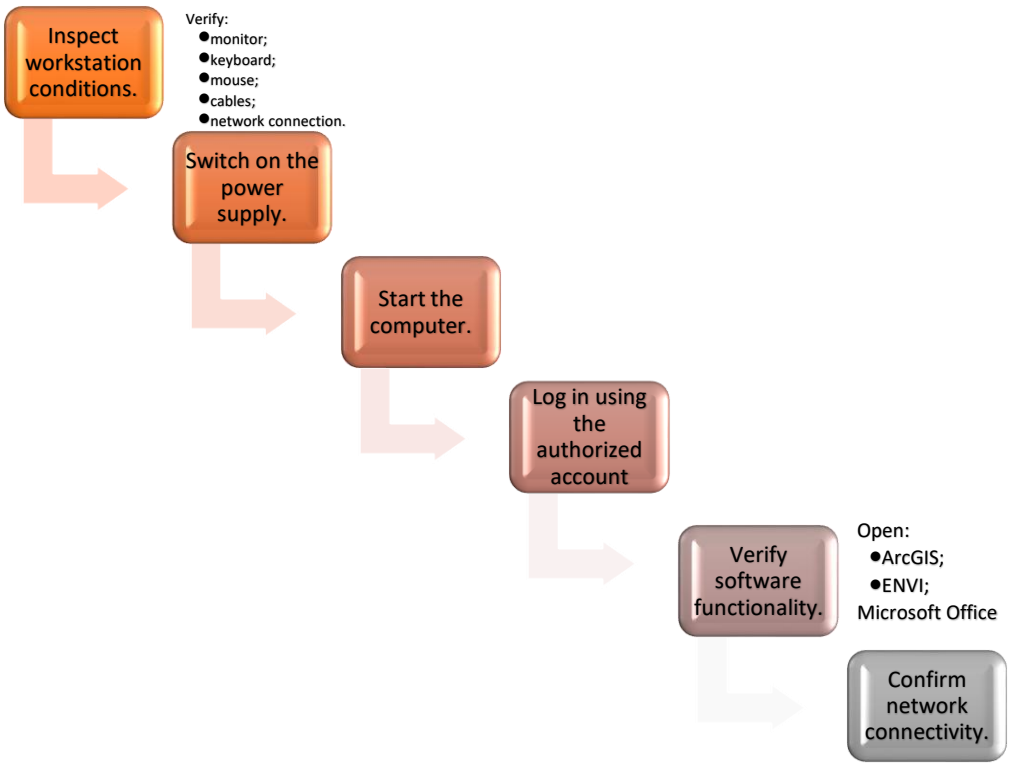
7.4.3 Supporting Applications

- Microsoft Office
- PDF Reader
- Internet Browser
- File Compression Utility
- Media Player

Additional software may only be installed with approval from the Head of Laboratory.

7.5 Computer Startup Procedure

Before each practical session, the Laboratory Assistant shall perform the following steps:



7.6 Student Login Procedure

Students shall:

1. Use only the assigned workstation.
2. Log in using the designated laboratory account.
3. Access only authorized folders.
4. Log out before leaving the laboratory.

Students shall not:

- change passwords;
- access administrator accounts;
- create unauthorized user accounts.

7.7 Operator Workstation Management

The operator workstation is designated exclusively for laboratory management.

Only the following personnel are authorized to use this computer:

- Head of Laboratory
- Laboratory Coordinator
- Laboratory Assistant
- Authorized Technical Personnel

The operator workstation shall be used for:

- laboratory administration;
- software licensing;
- system configuration;
- practical session management;
- maintenance activities;
- data backup.

Students are strictly prohibited from accessing the operator workstation.

7.8 Software Usage Procedures

ArcGIS

Users shall:

- create project folders before beginning work;
- maintain organized geodatabases;
- save projects regularly;
- verify coordinate systems before analysis;
- document processing workflows.

Recommended project structure:

GIS_Project

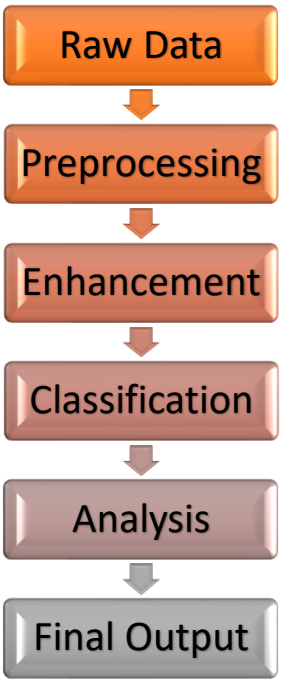
```
├── Data
├── Geodatabase
├── Raster
├── Vector
├── Maps
├── Layout
├── Output
└── Documentation
```

ENVI

Users shall:

- preserve original imagery files;
- create separate folders for processed data;
- document image processing parameters;
- maintain consistent file naming conventions.

Recommended workflow:



7.9 File Naming Standard

To ensure consistency, all laboratory files shall follow the standard naming convention:

StudentID_Name_Course_Assignment

Example:

2310523010_Ahmad_GIS_LandUseAnalysis

File names shall:

- use English characters;
- avoid special symbols;
- avoid spaces;
- remain concise and descriptive.

7.10 Data Storage Policy

Students are responsible for managing their own files.

Data may be stored in:

- designated local folders;
- external storage devices;
- institutional cloud storage (where available).

Users shall not save important files exclusively on laboratory desktops or temporary directories.

7.11 Backup Procedure

To minimize data loss, the following backup schedule shall be implemented.

Backup Type	Frequency
User Backup	Every Practical Session
Laboratory Backup	Weekly
System Backup	Monthly
Semester Archive	Every Semester

Important research data shall have at least two backup copies stored in different locations.

7.12 Software License Management

All software installed in the laboratory is licensed exclusively for academic use.

The Laboratory Coordinator shall maintain records of:

- software versions;
- license numbers;
- activation dates;
- renewal schedules;
- installation history.

Unauthorized duplication or distribution of licensed software is strictly prohibited.

7.13 Software Installation Procedure

Only Laboratory Assistants or authorized technical personnel may install software.

Installation procedure:

1. Verify software license.
2. Scan installation files for malware.
3. Create a system restore point.
4. Install software.
5. Test functionality.
6. Record installation details.
7. Update software inventory.

Students shall not install any software or plugins.

7.14 Software Update Procedure

Software updates shall be scheduled outside practical hours.

Update activities include:

- ArcGIS patches;
- ENVI updates;
- operating system updates;
- antivirus updates;
- security patches.

After every update, system functionality shall be verified before laboratory use.

7.15 Information Security Policy

Laboratory users shall protect institutional information assets.

Users shall:

✓ maintain password confidentiality;

✓ log out after every session;

✓ report suspicious activities;

✓ use only authorized storage devices.

Users shall not:

✗ access administrator accounts;

✗ disable antivirus software;

✗ install remote access applications;

✗ modify security configurations.

7.16 External Storage Device Policy

Flash drives and external hard drives may be used only after malware scanning.

Laboratory personnel may deny access to any storage device suspected of containing malicious software.

7.17 Internet Usage Policy

Internet access is intended solely for academic purposes.

Permitted activities include:

- accessing scientific journals;
- downloading satellite imagery;
- obtaining GIS datasets;
- accessing university learning systems;
- conducting academic research.

Prohibited activities include:

- downloading pirated software;
- streaming entertainment content;
- online gaming;
- unauthorized cloud synchronization;
- accessing illegal websites.

7.18 Preventive Computer Maintenance

Routine maintenance shall be conducted according to the following schedule:

Activity	Frequency
Computer Inspection	Daily
Temporary File Cleanup	Weekly
Antivirus Update	Weekly
Disk Optimization	Monthly
Hardware Inspection	Monthly
Software Verification	Monthly
Complete Maintenance	Every Semester

Maintenance activities shall be documented in the Laboratory Maintenance Log.

7.19 Incident Management

The following incidents shall be reported immediately:

- computer failure;
- ArcGIS licensing error;
- ENVI activation failure;
- operating system malfunction;
- virus infection;
- network interruption;
- data corruption.

An Incident Report Form shall be completed by the Laboratory Assistant.

7.20 User Responsibilities

Laboratory Coordinator

- Manage software licenses.
- Supervise maintenance activities.
- Approve system updates.

- Monitor laboratory computing resources.

Laboratory Assistant

- Prepare computers.
- Verify software functionality.
- Perform preventive maintenance.
- Provide technical support.
- Document incidents.

Lecturers

- Supervise software utilization.
- Ensure compliance with laboratory regulations.
- Report technical issues.

Students

Students shall:

- use computers responsibly;
- maintain workstation cleanliness;
- save files appropriately;
- protect laboratory equipment;
- report technical problems immediately.

7.21 Key Performance Indicators (KPIs)

Performance Indicator	Target
Computer Availability	≥ 98%
ArcGIS Operational Availability	100%
ENVI Operational Availability	100%
Network Availability	≥ 98%
Preventive Maintenance Completion	100%
Software License Compliance	100%
Data Loss Due to System Failure	0 Cases
User Satisfaction	≥ 90%

7.22 Documentation and Records

The following records shall be maintained as part of the Laboratory Quality Management System:

- Computer Inventory Register
- Software License Register
- Installation Log
- Software Update Log
- Preventive Maintenance Checklist
- Incident Report Form
- Backup Log
- Hardware Inspection Checklist
- Network Maintenance Log
- Annual Computer Performance Report

All records shall be retained in accordance with the Department of Geography's document control policy and shall be available for internal audits, accreditation processes, and quality assurance evaluations.

EQUIPMENT MAINTENANCE, SAFETY, AND QUALITY ASSURANCE PROCEDURES

8.1 Purpose

This chapter establishes standardized procedures for the inspection, maintenance, safety management, and quality assurance of all equipment and facilities within the Geographic Information Systems (GIS) Laboratory.

The objective is to ensure that laboratory infrastructure remains reliable, safe, functional, and capable of supporting teaching, research, community engagement, and professional training activities.

8.2 Scope

This procedure applies to:

- Computer workstations
- Operator workstation
- Network equipment
- Projector and multimedia equipment

- Electrical installations
- Air conditioning systems
- Peripheral devices
- Licensed software
- Laboratory furniture
- Laboratory personnel and users

8.3 Maintenance Policy

The GIS Laboratory adopts a Preventive Maintenance System, which emphasizes regular inspection, routine servicing, documentation, and continuous monitoring to minimize equipment failure and extend the service life of laboratory assets.

Maintenance activities shall be conducted according to:

- University regulations
- Manufacturer recommendations
- Laboratory Quality Management System
- Occupational Health, Safety, and Environment (OHSE) principles

8.4 Maintenance Responsibilities

Head of Laboratory

The Head of Laboratory shall:

- approve maintenance schedules;
- supervise quality assurance implementation;
- authorize equipment replacement;
- evaluate maintenance performance.

Laboratory Coordinator

The Laboratory Coordinator shall:

- prepare maintenance schedules;
- coordinate maintenance activities;
- maintain maintenance records;

- monitor equipment performance.

Laboratory Assistant

The Laboratory Assistant shall:

- perform daily inspections;
- conduct routine maintenance;
- document equipment conditions;
- report equipment failures;
- provide technical assistance during maintenance.

Users

All laboratory users shall:

- operate equipment responsibly;
- report equipment malfunctions immediately;
- avoid unauthorized modifications;
- comply with maintenance and safety procedures.

8.5 Laboratory Equipment Inventory

Equipment	Quantity
Student Computers	29 Units
Operator Computer	1 Unit
LCD Projector	1 Unit
Local Area Network	1 System
Air Conditioning Units	As Installed
Printer (Optional)	As Available
UPS/Power Protection	As Installed

All equipment shall be assigned an inventory identification number.

8.6 Preventive Maintenance Schedule

Daily Maintenance

Performed by Laboratory Assistant.

Activities include:

✓ Laboratory cleanliness inspection

✓ Computer startup verification

✓ Monitor inspection

✓ Keyboard and mouse inspection

✓ Network connectivity verification

✓ ArcGIS availability check

✓ ENVI availability check

✓ Air conditioning inspection

✓ Projector inspection

Weekly Maintenance

Activities include:

- temporary file cleanup;
- recycle bin cleanup;
- antivirus update;
- malware scan;
- disk space inspection;
- internet speed verification.

Monthly Maintenance

Activities include:

- hardware inspection;
- operating system update verification;
- ArcGIS functionality testing;
- ENVI functionality testing;
- network equipment inspection;
- projector testing;
- cable inspection.

Semester Maintenance

Activities include:

- complete hardware inspection;
- preventive cleaning;
- software verification;
- inventory audit;
- data backup verification;
- performance evaluation.

8.7 Computer Maintenance Procedure

Every workstation shall undergo inspection according to the following checklist.

Inspection Item	**Status**
CPU Operational	□
Monitor Operational	□
Keyboard Operational	□
Mouse Operational	□
LAN Connection	□
ArcGIS Operational	□
ENVI Operational	□
Storage Capacity	□
Antivirus Updated	□

Any abnormalities shall be recorded in the Maintenance Log.

8.8 Software Maintenance

The Laboratory Assistant shall verify:

ArcGIS

- application startup;
- licensing status;
- toolbox functionality;
- project compatibility.

ENVI

- licensing status;
- image processing functions;
- raster visualization;
- export functionality.

Supporting Applications

- Microsoft Office
- PDF Reader
- Internet Browser

Software updates shall only be performed outside scheduled practical sessions.

8.9 Network Maintenance

The Local Area Network shall be inspected regularly.

Inspection includes:

- switch operation;
- cable condition;
- internet connectivity;
- IP configuration;
- shared folder accessibility.

Network interruptions shall be documented and reported immediately.

8.10 Equipment Cleaning Procedure

Computer equipment shall be cleaned using appropriate materials.

Permitted cleaning materials:

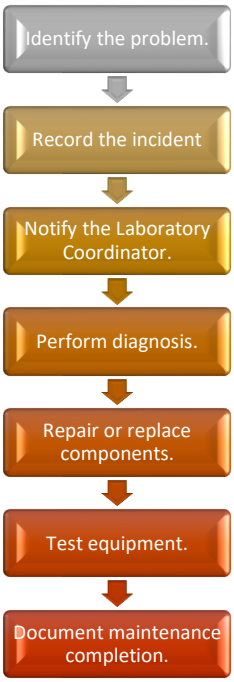
- microfiber cloth;
- compressed air;
- electronic cleaning solution.

Users shall not:

- spray liquid directly onto equipment;
- use excessive moisture;
- disassemble laboratory equipment.

8.11 Corrective Maintenance Procedure

When equipment failure occurs:



8.12 Equipment Damage Reporting

Every equipment malfunction shall be documented.

The Equipment Damage Report shall include:

- Date
- Equipment ID
- Description of damage
- User name
- Reported by
- Corrective action
- Maintenance completion date

8.13 Occupational Health, Safety, and Environment (OHSE)

The GIS Laboratory is committed to providing a safe and healthy working environment.

All laboratory users shall:

- maintain ergonomic posture;
- avoid touching electrical equipment with wet hands;
- keep emergency exits unobstructed;
- immediately report safety hazards.

8.14 Fire Safety

The laboratory shall provide:

- Fire extinguisher (APAR)
- Emergency exit signage
- Emergency contact information
- Evacuation route map

Users shall know the location of all emergency equipment before practical sessions begin.

8.15 Electrical Safety

Users shall:

✓ inspect power cables before use;

✓ avoid overloaded electrical outlets;

✓ report damaged electrical components immediately;

✓ disconnect equipment safely after maintenance.

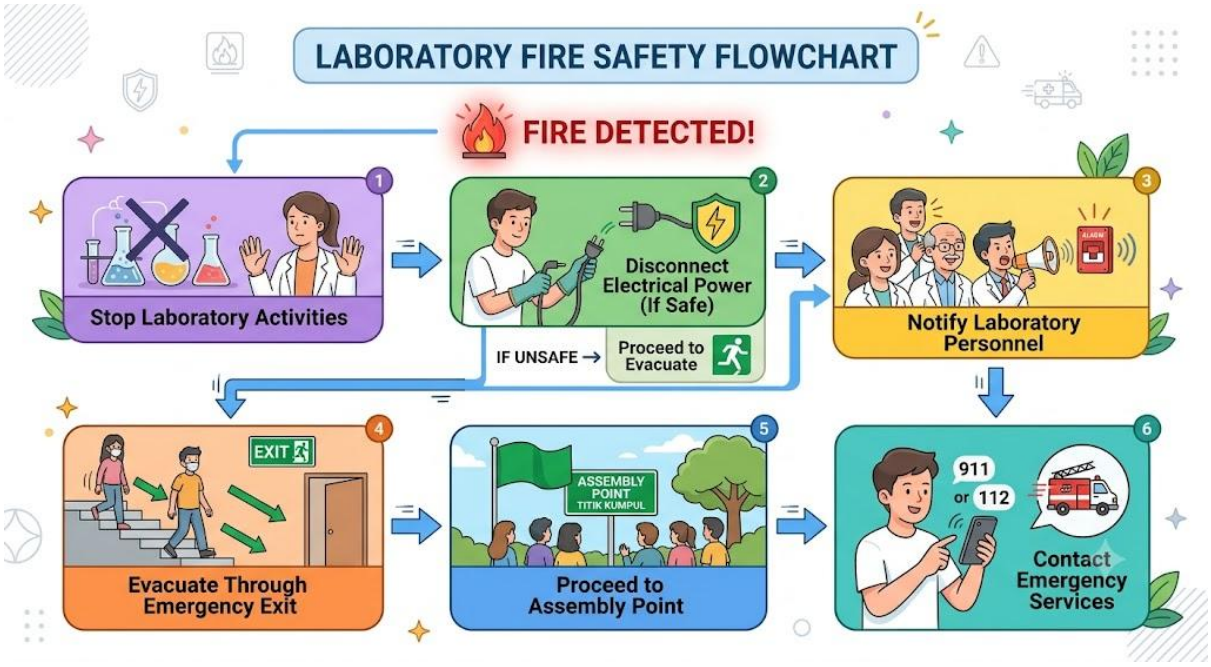
Unauthorized electrical repairs are strictly prohibited.

8.16 Ergonomic Guidelines

To reduce fatigue and musculoskeletal disorders, users should:

- maintain an upright sitting posture;
- position monitors at eye level;
- keep wrists in a neutral position;
- take a short break every 20–30 minutes;
- maintain a viewing distance of approximately 50–70 cm.

8.17 Emergency Response Procedure



Electrical Failure

Users shall:

- stop all activities;
- save work if possible;
- wait for instructions;
- avoid restarting equipment until authorized.

Medical Emergency

Laboratory personnel shall:

- provide initial assistance;
- contact medical services;
- record the incident;
- notify the Department if necessary.

8.18 Quality Assurance System

The GIS Laboratory implements a continuous quality assurance system to ensure high standards of laboratory services.

Quality assurance activities include:

- internal inspections;
- preventive maintenance;
- user satisfaction surveys;
- equipment calibration verification;
- annual performance evaluations;
- SOP review and revision.

8.19 Key Performance Indicators (KPIs)

Performance Indicator	Target
Computer Availability	≥98%
ArcGIS Operational Status	100%
ENVI Operational Status	100%
Network Availability	≥98%
Preventive Maintenance Completion	100%
Equipment Inspection Completion	100%
Major Equipment Failure	0 Cases per Semester
User Satisfaction	≥90%

8.20 Documentation and Record Control

The following records shall be maintained:

Document	Retention Period
Daily Inspection Checklist	5 Years
Preventive Maintenance Log	5 Years
Equipment Damage Report	5 Years
Software Maintenance Log	5 Years
Network Inspection Log	5 Years
Safety Inspection Checklist	5 Years
Annual Equipment Evaluation Report	Permanent
Inventory Register	Permanent

All records shall be stored securely and made available for internal audits, accreditation processes, and quality assurance reviews.

8.21 Continuous Improvement

The GIS Laboratory shall continuously improve its maintenance and quality management system by:

- evaluating maintenance performance annually;
- updating preventive maintenance schedules;
- replacing obsolete equipment;
- upgrading licensed software;
- enhancing laboratory infrastructure;
- implementing user feedback and audit recommendations.

OCCUPATIONAL HEALTH, SAFETY, ENVIRONMENT, AND EMERGENCY RESPONSE (OHSE)

9.1 Purpose

This chapter establishes the Occupational Health, Safety, Environment, and Emergency Response (OHSE) procedures for the Geographic Information Systems (GIS) Laboratory. The objective is to provide a safe, healthy, secure, and environmentally responsible learning and working environment for all laboratory users while protecting laboratory assets and ensuring continuity of academic activities.

Although the GIS Laboratory is a computer-based laboratory with relatively low physical hazards, potential risks associated with electrical equipment, prolonged

computer use, ergonomic factors, fire hazards, and information technology infrastructure require systematic risk management and preventive measures.

9.2 Scope

This chapter applies to:

- Laboratory Coordinator
- Laboratory Assistants
- Lecturers
- Students
- Researchers
- Technical Support Personnel
- Visitors
- Authorized External Users

It covers:

- Occupational health
- Laboratory safety
- Environmental management
- Emergency preparedness
- Emergency response
- Incident reporting
- Risk management

9.3 OHSE Policy

The GIS Laboratory is committed to:

- providing a safe and healthy learning environment;
- preventing accidents and occupational injuries;
- protecting laboratory facilities and information technology infrastructure;
- minimizing environmental impacts;
- complying with institutional safety regulations; and

- continuously improving safety performance through education, training, and evaluation.

Every laboratory user shares responsibility for maintaining a safe laboratory environment.

9.4 General Safety Rules

All laboratory users shall:

✓ Follow all laboratory safety instructions.

✓ Use laboratory equipment only for authorized purposes.

✓ Keep work areas clean and organized.

✓ Report hazards immediately.

✓ Maintain clear access to emergency exits.

✓ Follow evacuation procedures during emergencies.

Users shall not:

✗ Tamper with electrical systems.

✗ Block emergency exits.

✗ Smoke inside the laboratory.

✗ Bring hazardous materials into the laboratory without authorization.

9.5 Hazard Identification

The GIS Laboratory identifies the following potential hazards:

Hazard	Potential Risk
Electrical Equipment	Electric shock
Computer Hardware	Equipment failure
Power Cables	Trip hazards
Prolonged Computer Use	Eye strain and fatigue
Poor Ergonomics	Musculoskeletal disorders
Network Infrastructure	Operational disruption
Fire	Property damage and injury

Routine inspections shall be conducted to identify and eliminate hazards before laboratory activities begin.

9.6 Personal Safety Requirements

Every laboratory user shall:

- wear appropriate academic attire;
- use closed-toe footwear;
- maintain good personal hygiene;
- avoid bringing unnecessary personal items into the laboratory;
- maintain awareness of surrounding conditions.

Users who feel unwell should immediately notify the Lecturer or Laboratory Assistant.

9.7 Ergonomic Safety

Because GIS practical sessions involve prolonged computer use, users shall apply ergonomic best practices.

Workstation Setup

Users shall:

- adjust chairs to maintain proper posture;
- position monitors at eye level;
- keep elbows at approximately 90 degrees;
- place feet flat on the floor.

Screen Distance

Recommended monitor distance:

50–70 cm from the user's eyes

Rest Period

Users are encouraged to follow the 20-20-20 Rule:

Every 20 minutes:

- look at an object approximately 20 feet away;
- for at least 20 seconds.

Short stretching exercises are recommended every 60 minutes.

9.8 Electrical Safety

Laboratory computers operate using electrical power and shall be handled carefully.

Users shall:

✓ inspect visible cables before use;

✓ report damaged cables immediately;

✓ disconnect power safely when instructed;

✓ keep liquids away from electrical equipment.

Users shall not:

✗ overload electrical outlets;

✗ unplug network equipment;

✗ perform electrical repairs;

✗ touch electrical equipment with wet hands.

Only authorized personnel may perform electrical maintenance.

9.9 Fire Safety

Potential fire sources include:

- electrical short circuits;
- overloaded power outlets;
- damaged power cables;
- malfunctioning electronic equipment.

The laboratory shall provide:

- fire extinguisher (APAR);
- emergency exit signs;
- evacuation maps;
- emergency contact information.

Fire extinguishers shall be inspected regularly.

9.10 Emergency Equipment

The laboratory shall maintain:

Equipment	Status
Fire Extinguisher	Available
Emergency Exit Sign	Available
First Aid Kit	Available
Emergency Contact List	Available
Assembly Point Map	Available

Laboratory personnel shall inspect emergency equipment every semester.

9.11 Emergency Response Procedures

Fire Emergency

Step 1

Remain calm.

↓

Step 2

Stop laboratory activities immediately.

↓

Step 3

Disconnect electrical power if safe to do so.

↓

Step 4

Notify the Laboratory Assistant.

↓

Step 5

Evacuate through the nearest emergency exit.

↓

Step 6

Proceed to the designated assembly point.

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Step 7

Await further instructions.

Electrical Failure

Users shall:

- stop practical activities;
- save files if possible;
- wait for instructions;
- avoid restarting computers until authorized.

Laboratory personnel shall inspect electrical systems before resuming operations.

Computer System Failure

If multiple computers fail simultaneously:

Users shall:

- stop working immediately;
- save available data;
- report the problem;
- avoid attempting repairs.

The Laboratory Assistant shall diagnose the problem and document the incident.

Network Failure

During network interruption:

- local practical activities may continue;
- internet-dependent activities shall be postponed;
- laboratory personnel shall verify network infrastructure before restarting services.

Medical Emergency

If a laboratory user experiences illness or injury:

1. Notify the Laboratory Assistant.

2. Provide initial assistance if safe.
3. Contact emergency medical services if required.
4. Record the incident.
5. Inform the Department.

9.12 Emergency Evacuation Plan

Evacuation priorities shall be:

1. Students
2. Visitors
3. Lecturers
4. Laboratory Assistants

All users shall proceed calmly to the designated assembly point.

No person shall re-enter the laboratory until authorized.

9.13 Incident Reporting Procedure

Every incident shall be documented.

The Incident Report shall include:

- Date
- Time
- Location
- Persons involved
- Description of incident
- Immediate action taken
- Corrective action
- Responsible personnel

Incident reports shall be submitted to the Laboratory Coordinator within 24 hours.

9.14 Environmental Management

The GIS Laboratory supports environmentally responsible operations.

Users are encouraged to:

- minimize paper usage;
- use digital submissions;
- switch off monitors when not in use;
- conserve electricity;
- avoid unnecessary printing.

Laboratory personnel shall promote energy-efficient laboratory operations.

9.15 Waste Management

Typical laboratory waste includes:

- paper;
- printer cartridges;
- packaging materials;
- damaged peripherals;
- electronic waste.

Electronic waste shall be disposed of according to university regulations and applicable environmental standards.

9.16 Risk Assessment Matrix

Risk Level	Definition	Action Required
Low	Minor inconvenience	Routine monitoring
Moderate	Operational disruption	Corrective action
High	Injury or equipment damage	Immediate intervention
Critical	Serious injury or major loss	Emergency response

Risk assessments shall be reviewed annually.

9.17 Safety Training

All laboratory personnel shall participate in periodic safety training covering:

- laboratory regulations;

- fire safety;
- electrical safety;
- emergency evacuation;
- ergonomic practices;
- incident reporting procedures.

New laboratory assistants shall receive orientation before assuming duties.

9.18 Internal Safety Inspection

Safety inspections shall be conducted according to the following schedule:

Inspection	Frequency
Laboratory Safety Inspection	Monthly
Electrical Inspection	Every Semester
Fire Equipment Inspection	Every Semester
Emergency Exit Inspection	Monthly
Ergonomic Assessment	Annually

Inspection findings shall be documented and reviewed during laboratory evaluation meetings.

9.19 Key Performance Indicators (KPIs)

Performance Indicator	Target
Laboratory Accidents	0 Cases
Fire Incidents	0 Cases
Electrical Accidents	0 Cases
Emergency Equipment Availability	100%
Safety Inspection Completion	100%
Incident Reporting Compliance	100%
User Safety Training Participation	≥95%
User Satisfaction	≥90%

9.20 Documentation and Record Control

The following documents shall be maintained:

- Safety Inspection Checklist
- Incident Report Form
- Emergency Contact List
- Fire Extinguisher Inspection Log
- Electrical Inspection Log
- Risk Assessment Register
- Safety Training Attendance Record
- Emergency Drill Report
- Environmental Inspection Report

All records shall be retained in accordance with the Department of Geography Document Control Procedure and shall be available for internal quality audits, accreditation processes, and continuous improvement initiatives.

9.21 Continuous Improvement

The GIS Laboratory shall continuously improve its OHSE management system through:

- annual policy reviews;
- regular risk assessments;
- emergency drills;
- user feedback;
- internal quality audits;
- preventive actions;
- corrective actions;
- infrastructure upgrades.

Lessons learned from incidents and near-miss events shall be incorporated into future revisions of this SOP.

DOCUMENT CONTROL, RECORD MANAGEMENT, AND CONTINUOUS IMPROVEMENT

11.1 Purpose

This chapter establishes standardized procedures for document control, record management, internal audits, performance monitoring, and continuous improvement within the Geographic Information Systems (GIS) Laboratory.

The purpose of these procedures is to ensure that all laboratory documents are properly created, reviewed, approved, distributed, maintained, archived, and revised in accordance with institutional quality management principles and international best practices.

11.2 Scope

This chapter applies to all documents and records generated by the GIS Laboratory, including:

- Standard Operating Procedures (SOPs)
- Laboratory manuals
- Work instructions
- Practical modules
- Forms and checklists
- Attendance records
- Maintenance records
- Equipment inventories
- Incident reports
- Internal audit reports
- Quality assurance documents
- Training records
- Meeting minutes

11.3 Document Control Policy

All laboratory documents shall be:

- uniquely identified;
- reviewed before approval;
- approved by authorized personnel;
- periodically updated;
- distributed in a controlled manner;
- protected against unauthorized modification;
- archived according to the document retention schedule.

Only the latest approved version of a document shall be used for laboratory operations.

11.4 Document Classification

Laboratory documents shall be classified as follows:

Document Type	Description
Quality Manual	Overall laboratory management guidelines
Standard Operating Procedure (SOP)	Operational procedures
Work Instruction (WI)	Detailed operational guidance
Form (FRM)	Data collection document
Checklist (CHK)	Inspection and verification document
Record (REC)	Evidence of completed activities

11.5 Document Identification System

Each document shall have a standardized identification code.

Example:

SOP-GIS-001

Where:

Code	Description
SOP	Standard Operating Procedure
GIS	Geographic Information Systems Laboratory
001	Sequential Document Number

Example Document Codes

Document	Code
GIS Laboratory SOP Manual	SOP-GIS-001
Computer Maintenance Procedure	SOP-GIS-002
Safety Procedure	SOP-GIS-003
Attendance Form	FRM-GIS-001
Equipment Inspection Checklist	CHK-GIS-001

11.6 Document Approval Process

Every official laboratory document shall follow the approval process below.

Document Draft

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Technical Review

↓

Quality Review

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Head of Laboratory Approval

↓

Document Release

↓

Implementation

↓

Periodic Review

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Revision (if required)

No document may be implemented before receiving official approval.

11.7 Document Revision Control

Documents shall be reviewed:

- annually;
- after internal audits;
- following laboratory infrastructure changes;
- after software upgrades;
- after policy changes;
- after major incidents;
- whenever continuous improvement initiatives require updates.

Each revision shall include:

- revision number;
- revision date;
- description of changes;
- approval signature.

11.8 Distribution of Controlled Documents

Controlled documents may be distributed to:

- Head of Laboratory;
- Laboratory Coordinator;
- Laboratory Assistants;
- Lecturers;
- Quality Assurance Unit;
- Department Administration.

Electronic versions shall be stored on the official laboratory storage system with controlled access permissions.

Printed copies shall be marked:

CONTROLLED COPY

Uncontrolled copies are intended for reference purposes only.

11.9 Record Management Policy

Laboratory records provide evidence that activities have been performed according to established procedures.

Records shall be:

- accurate;
- complete;
- legible;
- identifiable;
- retrievable;
- securely stored;
- protected from damage or unauthorized access.

11.10 Record Retention Schedule

Record	Retention Period
Attendance Log	5 Years
Laboratory Reservation Form	5 Years
Practical Session Record	5 Years
Equipment Maintenance Log	5 Years
Software Maintenance Log	5 Years
Incident Report	5 Years
Internal Audit Report	5 Years
Training Record	5 Years
Equipment Inventory	Permanent
Annual Performance Report	Permanent

Expired records shall be disposed of according to university document disposal policies.

11.11 Internal Quality Audit

Internal quality audits shall be conducted to verify compliance with laboratory procedures and quality standards.

The audit shall evaluate:

- SOP implementation;
- laboratory management;
- equipment maintenance;
- software management;
- documentation;
- safety compliance;
- user satisfaction.

Audit Frequency

Audit Type	Frequency
Internal Quality Audit	Once Every Semester
Documentation Audit	Once Every Semester
Equipment Audit	Once Every Semester
Inventory Audit	Once Every Year

11.12 Corrective and Preventive Actions (CAPA)

When nonconformities are identified, corrective and preventive actions shall be implemented.

Corrective Action Process

Nonconformity Identified

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Root Cause Analysis

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Corrective Action Plan

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Implementation

↓

Verification

↓

Documentation

↓

Closure

Preventive actions shall focus on eliminating potential problems before they occur.

11.13 User Feedback and Satisfaction Evaluation

The laboratory shall conduct periodic user satisfaction surveys.

Evaluation aspects include:

- laboratory cleanliness;
- computer performance;
- software availability;
- internet connectivity;
- technical assistance;
- laboratory environment;
- overall service quality.

Survey results shall be analyzed and incorporated into laboratory improvement plans.

11.14 Performance Monitoring

Laboratory performance shall be monitored using measurable indicators.

Key Performance Indicator (KPI)	Target
Computer Availability	≥98%
ArcGIS Availability	100%
ENVI Availability	100%
Laboratory Readiness	≥98%
Maintenance Completion	100%
User Satisfaction	≥90%
Internal Audit Completion	100%
Safety Compliance	100%

11.15 Continuous Improvement Program

The GIS Laboratory adopts the Plan–Do–Check–Act (PDCA) methodology to improve laboratory performance.

PLAN

↓

DO

↓

CHECK

↓

ACT

↓

Continuous Improvement

Continuous improvement activities may include:

- updating SOPs;
- upgrading computer hardware;
- updating licensed software;
- improving laboratory services;
- strengthening information security;
- enhancing user training programs.

11.16 Management Review

The Head of Laboratory shall conduct an annual management review covering:

- laboratory performance;
- audit results;
- user feedback;
- maintenance activities;
- infrastructure needs;

- software licensing;
- risk management;
- quality objectives.

Recommendations from the management review shall form the basis for the following year's laboratory development plan.

11.17 Confidentiality and Information Security

Laboratory documents containing confidential information shall be protected through:

- controlled access;
- password protection;
- secure storage;
- restricted distribution.

Only authorized personnel may access confidential records.

11.18 Documentation for Accreditation

The GIS Laboratory shall maintain documentation supporting:

- University Internal Quality Assurance System (SPMI)
- National Accreditation Requirements
- International Quality Assurance Frameworks
- ISO 9001:2015 Quality Management Systems
- AUN-QA Standards

Documentation shall be organized and readily available for internal and external reviewers.

11.19 Responsibilities

Head of Laboratory

- Approve official documents.
- Review laboratory performance.
- Lead management review meetings.

- Authorize document revisions.

Laboratory Coordinator

- Maintain document control.
- Archive laboratory records.
- Coordinate internal audits.
- Monitor KPI achievement.

Laboratory Assistant

- Complete operational records.
- Maintain maintenance logs.
- Report incidents.
- Support documentation activities.

Lecturers and Users

- Comply with current SOPs.
- Complete required forms accurately.
- Protect laboratory documentation.
- Participate in quality improvement initiatives.

11.20 Chapter Summary

This chapter establishes a comprehensive Document Control, Record Management, and Continuous Improvement System for the GIS Laboratory. It ensures that all operational documents, quality records, maintenance logs, audit reports, and performance evaluations are systematically managed throughout their lifecycle. By integrating document control, internal auditing, CAPA, KPI monitoring, PDCA methodology, and management review, the laboratory promotes transparency, accountability, and sustainable quality enhancement.

The procedures outlined in this chapter are aligned with the principles of ISO 9001:2015 Quality Management Systems, AUN-QA, and international best practices for academic GIS laboratories, supporting excellence in education, research, and laboratory governance.

4. **ACTIVITY DOCUMENTATION**
   https://bit.ly/ACTIVITY_DOCUMENTATION_LAB