RWANDA POLYTECHNIC

RWANDA POLYTECHNIC GUIDELINES FOR CAPSTONE PROJECT IMPLEMENTATION

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List of acronyms and abbreviations

ASWP	Academic Staff Workload Policy
BTech.	Bachelor of Technology
DAS	Director in Charge of Academic Services
CP	Capstone Project
HEC	High Education Council
HoD	Head of Department
ILE	Integrative Learning Experience
IP	Intellectual Property
MoU/A	Memorandum of Understanding/Agreement
NDA	Non-Disclosure Agreement
PPE	Personal Protective Equipment
PPT	Power Point Presentation
Q&A	Questions and Answers
RP	Rwanda Polytechnic
RQF	Rwanda Qualification Framework
TVET	Technical and Vocational Education and Training
WPL	Workplace Learning

1. Introduction

Rwanda Polytechnic aims to offer high quality education that meets the needs of the society. To ensure that quality standards are met in all its constituent colleges, guiding tools for harmonization of practices for academic and research activities are of capital importance. The capstone project is one of the core modules that all students completing their Bachelor of Technology cycle need to undertake. The implementation of capstone projects has been challenging for both students and lecturers due to the lack of proper guidelines that provide clear guidance on the processes and responsibilities of the parties involved. This capstone project implementation guide serves as an institutional tool that provides an implementation framework for quality assurance and harmonization of practice for the conduct of the capstone project from its initiation to final submission.

2. Rationale

Rwanda Polytechnic strives to mold an effective academia-industry collaboration in its mission to deliver pertinent technical and applied competencies to its trainees while providing work-ready graduates to the expanding labor market. Besides usual industrial exposure, students are eventually encouraged to work on real-world problems for the institution's relevance in solving societal challenges. To achieve that high-end goal, the commitment to applied research and innovations is to involve the on-site experience of industry/companies' partners.

Being a critical component of the research and innovation agenda, academic projects open gates to students' growth by translating acquired hands-on skills into tangible solutions. The capstone project concludes the undergraduate program by tackling such problem-based projects through a bilateral involvement of academicians and industry professionals. A student pursues independent research on an identified problem/challenge and engages with scholarly and professional debates in the relevant discipline, with concrete guidance from academic and industry supervision. The output reflects a deep understanding of the subject matter and contributes innovative solutions addressing a specific problem, a predetermined issue, or a concern in the field of study.

As a non-classroom learning module, the capstone project will not only demonstrate a student's comprehensive knowledge of the area of the study, but also will allow him/her to apply skills, concepts, and methods to a specific problem in his/her area of specialization. This Integrative Learning Experience (ILE) scheme has been set to culminate the undergraduate training package with the overall purpose of enhancing the students' professional achievement and demonstrating the ability to integrate the acquired core competencies in problem-solving.

The present document serves as a procedural guide that determines norms for a capstone project implementation at Rwanda Polytechnic. It describes and delineates stages applicable when preparing, conducting, reporting, presenting, evaluating, and approving the capstone project proposal and the final report. A structured clear framework is herein detailed to ensure all parties involved understand their roles, responsibilities, and expectations.

2. Capstone Project Implementation Norms

This section sets up norms for the course of actions over the entire project implementation from initiation to final evaluation and involves various stakeholders; whether students, academic and administrative staff, college management, and industry partnering professionals.
These overarching principles shall be observed:

- Due to the wanted ownership, the capstone project will be conducted by one student. However, depending on the project's complexity or relevance, two or more proponents may be asked to pair up. Such distinct complexity features will be recorded by the department headship in the final project report. These may be the involvement of diversified areas of specialization, project stretch in terms of implementation requirements, etc.

- Owing to its advanced expectations and involved remote academia-industry interactions, the CP duration spans over the academic year entirety (Section 2.4). To allow for a smooth concurrency with other modules, the high implementation workload is condensed during the second semester.
- Upon the project report presentations, the department headship will provide a comprehensive report addressed to the College management that contains a comparative and assessment narrative of the projects' outcomes.

2.1 A culminating project based on academia-industry Collaboration

As encouraged by the national Science, Technology and Innovation policy and the national WPL policy; academia-industry collaboration is recommended to enhance the responsiveness of innovative solutions to societal problems.

- The uniqueness of CP is to interact and network with the professional community interested in the project, its data, or its deliverables.
- The joint efforts on the industry side mainly consist of the problem-based topic selection or approval and the implementation follow-up and guidance that may extend to the project co-supervision.
- The industry partners are expected to provide technical advisory assistance, temporal research or production space, any needed data and/or an industry-based co-supervisor.

2.2 Project Topic Selection

In addition to its community relevance, the CP topics should be aligned with the institutional research agenda that is developed based on societal development challenges. Four ways to select the project title by order of interest are:

- A project theme identified by an industry that reflects its existing problem or its future technology improvements.
- Based on emerging technology trends, completion recommendations of precedent projects, and industry suggestions; the department will have a predetermined topics list of CPs with corresponding industry partners.
- From his/her field of acquaintance or experience, a student can suggest his/her research orientation and seek a fitful partnering industry. When presenting his/her CP title, a student should specify his innovation contribution with reference to the updated relevant literature.
- Based on the student's suggestion, the department staff may improve or suggest a closely related focus while maintaining the industry involvement aspect.

The final approval of topics must be done by the supervision team appointed by the department headship that assigns the supervisor. The accepted topics should fulfill the following conditions:

- The topic of investigation should be clear, researchable, specific and objective.
- The subject of investigation should be original in terms of innovative contributions.
- Similar topics or replicas of another work should be avoided, unless it is clearly stated how a new contribution is made in using advanced technology, exploring a different context that can bring new insights.

2.3. Capstone Project stages

The whole CP process starts with the meaningful task of identifying the research focus. This is about seeking to define the research question(s) for a located existing problem, from which the project title is inferred. The CP process ends with the submission of approved project deliverables. The capstone project encompasses three stages; and at every stage of completion, the student submits specific deliverables for evaluation.

2.3.1 Preliminary Pre-proposal stage

As a mainspring to the success of all further efforts, this stage is the landmark. It is comprised of the following activities:

(a) Problem Identification

Through the topic selection process described above, the BTech student will first suggest his/her research idea. If the ideation is not at the expected height, the departmental supervision team will recommend some improvements to adapt or suggest a project theme from the department listing. The following steps consist of the student problem identification process:

- Through industry consultation, self-ideation, literature, peers/trainers brainstorming, or any other scholarly discussions; a student identifies the industry-based problem that aligns with his academic discipline.
- From the identified problem, the student formulates research question(s), from which a research topic is inferred.
- If the problem identification process has not had any industry involvement, the student locates an industry partner.
- Based on the revealed research focus, the department headship appoints the supervisor and co-supervisor(s) and the appointment may extend beyond the college borders to any RP staff. In case, the department headship or a student is willing to have an industry co-supervision, the student will be given the college recommendation to present to the chosen industry.

(b) Delineation of Project Objectives/Goals and Planning

Upon securing valid research question(s), the student starts to interact with the appointed supervisors to reach a consensus on project objectives/goals and planning.

- **Collection of Pertinent Literature**: Though the step of searching for the relevant literature is continuous over the CP duration, a student is initially encouraged to go through extensive reading to: (i) understand the basics, (ii) identify the research gap,
  (iii) Conduct feasibility studies that take into consideration the technical, operational, and economical cost-benefit aspects, (iv) Investigate and evaluate existing solutions against the identified problem(s) and(v) Elaborate the theoretical/conceptual basis for the study and establish a framework on how to apply skills acquired to obtain a solution to the problem(s)
- **Project Description/Planning:** The student writes down a brief capstone project synopsis, say a 4-to-10 pages concept paper. In fact, it is the initial content of the project proposal that briefly puts together the identified problem, research question(s), objectives, brief literature review, proposed approach to the problem, and a rough activities sequence. The capstone synopsis gives a shallow picture of the project motives and plan, which helps the supervisor to allow for the content expansion into a project proposal.

2.3.2 Proposal writing and presentation

Upon the capstone synopsis approval, the student embarks on its extended proposal writing.

- Through the guidance of the supervisor or co-supervisor(s), the student follows the proposal writing norms.
- Upon the proposal completion, the student submits the manuscript to the department headship one week ahead of the presentation.
- The department will assign three academic staff as presentation panelists: (1) one being a project supervisor who acts as the panel secretary and (2) two remaining academic members, wherein one is appointed as chairperson whereas the other reads and collects comments ahead of the presentation.
- A student will be allowed to move on with the project implementation or may be asked to adjust his proposal as to the comments and submit it, with or without having to present in front of the panel again. For the later, the supervisor will ensure that every comment is addressed accordingly and report to the panelist member.

A good research proposal should provide sufficient brief information, a solid background, a clear research question(s), an appropriate rationale, and a concise methodological framework (with a proper study plan and suitable methods). It should be ethically acceptable, financially feasible, and can be successfully completed over one academic year stretch.

2.3.3 Project implementation and report writing

This is a more meaningful and time-consuming stage as it converts the ideation and planned undertakings into an assessable output. Pre-validated proposal design, methods, and materials are put into use with adherence to a set time frame.

- Based on the nature and objectives of the CP, the implementation location might be at the college campus or in the industry.
- For regular pulse checking to ensure constant project progress, the implementation monitoring is like the compass that keeps a project headed in the right direction. To keep progressive records on the project status; a systematic verification shall be conducted using a progress monitoring tracker (Appendix 1).
- The department will organize a pre-defense for all project proponents during the last month, 3-4 weeks before the project's presentation. The presentation carries no marks but is compulsory and it is public where the academic staff and CP proponents of the department are the main audience.
- The pre-defense shall focus on assessment and feedback provision to the CP experimental design, findings or product design and applicability. The implementation stages must be translated into a well elaborated report describing the CP process and final findings or product. The report is written in English as the medium of instruction at RP. All sources used in the report should be properly referenced using standard referencing styles.

Ethics considerations

- While using responsibly the Artificial Intelligence tools, students are encouraged to avoid whatever plagiarism and other research misconduct.
- Maintaining credibility, research integrity, and collaborative writing & authorship.
- Students should adhere to a certain code of conduct when collecting data from people and using other researchers' resources. Typically, anonymity, voluntary participation, confidentiality, informed consent, avoiding potential harm, results communication, proper citation and recognition of others' contribution.
- Data Distribution (Confidentiality & IP): Students should not make sensitive information (i.e. data subjected to licenses, copyrights, or confidentiality agreements) available to third parties or generally available online without authorization from the original data source of data and/or its respective contributor/owner(s). If a student is working with confidential data (Human or animal subjects), a binding Non-Disclosure Agreement (NDA) or ethical clearance will likely be necessary, and RP is the only party to initiate and endorse the agreement.

2.3.4 Presentation and evaluation of the capstone project report

Capstone projects must show how specifically a student has explored, developed, and extended or applied the concepts and pre-determined methodologies, present clearly the findings or the product developed during the study and the recommendation as well as other study's implications in terms of policy, technological advancement, socio-economic development, among others. The final report presentation intends to evaluate students' capacities for autonomous work and self-directed research. A project proponent is eligible for defense only if:

- The supervisors have gone through the manuscript and affirmed the abidance to the guidelines with a proofread text. The supervisor recommends the project presentation by signing the approval sheet within the CP report, at least five (5) working days before the defense schedule.
- After approval of the supervisor, the student must immediately submit a softcopy of the CP report and the project prototype (if applicable) to the department headship that appoints the reading panel member.

Except for special panelist consideration, the defense duration should not exceed 30 minutes: 15 minutes dedicated to the presentation, 5 minutes for the physical examination of the CP product and 10 minutes for the Q&A session.

CP evaluation: The typical assessment yardsticks may be: Presentation and Q&A sessions, the exerted learning efforts, adherence to the process timelines and progress monitoring plan, compliance with reporting guidelines, the quality of CP end-result and other deliverables in terms of innovative contribution. The contribution deliberation may basically categorize the CP product innovation as (1) a concept replication (the minimal innovation repeating with minor variations on an idea that already exists), (2) forward incrementation (next steps forward along existing progression lines) or (3) a redirection/radical shift (totally diverging from existing line of progression); and recognize the efforts level accordingly.

The deliberation criteria consist of the following:

- The initial project objectives have been achieved to an acceptable level
- All deliverables (Table 1) have been qualitatively covered with an acceptable degree of satisfaction and they reflect the project title,
- The presentation was well-prepared and delivered; and
- The post-presentation Q&A session is convincing of students' acquired aptitude.
- The project product is excellent, exhibits exquisite hands-on skills and it is well-documented.

The four possible verdicts after the defense are:

i. **Accepted:** Immediate approval with reference to perfect achievements in terms of project objectives, results, and reporting.

ii. **Accepted with minor revisions:** Mostly about a defective project form, failure to meet formal template provisions, and erratic mentions.

iii. **Accepted with major revisions:** Major revisions are meant to enhance the project context, and the amendments are brought up again in front of the panelists for the final research report acceptance. The panel members set the duration of the revision; if not met or the student fails to pass on the second defense occasion, he/she repeats the capstone project module the following academic year.

iv. **Rejected:** This pertains either to unmet key project objectives or could not fully defend the salient findings/results. The verdict is a unanimous decision. Once issued, it is final and irrevocable. The student repeats the capstone project module.

More on assessment criteria are detailed within RP assessment guidelines.

Table 1 Project deliverables at each implementation stage

SN	Stage	Deliverables
1	Preliminary Pre-proposal stage	(-) Research questions (-) Project title, objectives and goals (-) Technical advisor in the supervision team (-) Capstone project Concept paper/synopsis
2	Proposal Writing & presentation	(-) Project proposal manuscript with the indicated content (-) A project proposal PPT
3	Capstone project implementation	(-) A progressively endorsed monitoring tool (-) Under-development capstone project product (-) Ongoing data analysis and in-progress report drafting
4	Final Project Defense	(-) The defense approval form duly signed by the supervisor and approved by the department headship (-) The completed capstone project product (-) The soft copy of the proposed Final Project report (-) The CP's final PPT
5	Post-defense Compliance	(-) The bettered or improved capstone project product (-) One hard copy of the revised final project report for the library (-) Soft copy of the revised final version shared with the service Emails of the HoD, the Librarian, Supervisor, Co-supervisor(s) and the DAS.

2.4 Credits and time commitment

As a substantial module to leverage the prior training package, the capstone project bears the highest load of credits weight. The corresponding time commitment is distributed accordingly.

- The CP significance is translated into hourly commitment according to the convenience from the teaching workload and the coursework for the supervisors and students, respectively. However, the implementation will be periodically monitored along the academic year with reference to the Academic Staff Workload Policy directives. The training facilities and equipment at any RP college are accessible to CP proponents at any convenient time allowing a smooth delivery of teaching activities.
- Regular progress meetings of a student with supervisors are milestones towards every step's effectiveness and feasibility as to the academic calendar predictions.
- In addition, students are individually expected to devote a considerable weekly hour for the CP purpose.
  To that end, every student will initially make a consultation blueprint submitted to the supervisor and assessed against the progress tracker records. The blueprint, as exemplified in Table 2, will be in accordance with key academic calendar dates.

Table 2 A typical blueprint for capstone project activities

Steps	Period predictions	Activity	Responsible parties	Contact Hours
Project Identification	Semester 1, week 1-2	• Potential industry partners identification through MoU/MoA. • Develop and agree on a project catalogue.	Academic Institution and Industry Partners	10
Project planning	Semester 1, week 3-6	• Project plan development, including a timeline, budget, and deliverables.	Students, Academic Institutions, and Industry Partners	20
Project execution	Semester 1, and 2, week 6-20	• Students execute their project plan and collect data.	Students, Academic Institutions, and Industry Partners	150
Supervisors pre-validation	Semester 2, week 21-23	• Students submit their project report, presentation, and other deliverables to the supervision team.	Lead supervisor and technical advisor (Industry)	10
Project defense	Semester 2, week 24	• Students defend the project to the panel member.	Students and panel members	10
Total number of hours [20Credits]				**200**

Note: The contact hours consist of interactive consultations period with the project supervisors rather than the time a student commits himself to the project implementation. The summation is supposed to be equivalentto the credits allocat ion of the capstone project module.

- To avoid excess workload towards the project end while efficiently using the existing teaching equipment, the work on capstone projects should be evenly allocated over the two semesters. However, all key preparations should be initiated at the beginning of the academic year, whereas the implementation activities will be condensed upon its half.
- Due to its simultaneous implementation with other modules, the CP will be predominantly conducted at the college campus. However, the industry partnership may imply intermittent relocations to share the experience and resources, and the final defense may be held at any of both locations.

3. Duties and responsibilities

The development and defense of the capstone projects involve the following key parties:

3.1 The student as capstone project proponent

- Be informed of the capstone project guidelines, RP research policy and agenda.
- Putting to use the competencies acquired through past education background while conducting individual research.
- Provide and respect the activities plan of the capstone project and set deadlines. Submit on time the following: (1) herein stated deliverables and those specified by the supervisors or department, (2) Requirements identified by the panel members.
- Meet the project supervisors periodically throughout the project duration to report on the work progress, and raise any issues or concerns,
- Get the progress tracker form endorsed at every single meeting with the supervisors,
- Display ethical & professional behaviors, good attitude and soft skills for the employability-oriented capstone projects,
- Come up with a high-quality product that is useful to the industry/company partners, RP, or society in general.

3. 2 The program-hosting department

The student's department is responsible for:

- Setting up the general capstone project schedule for all students
- Appointing a team of supervisors to assess the relevance of CP ideations suggested by students
- Preparing its own suggestion list of impactful project themes with reference to identified solution needs
- Allocating the campus-based supervision team to each capstone project
- Follow up on the implementation of the capstone project, as to the guidelines
- Assigning suitable panel members to every capstone project
- Plan and coordinate the capstone project presentations and ensure the fairness of the marking process
- Collecting the assessment results and capstone project reports

3.3 The co-supervisor(s)

The implementation of CP may require at least one co-supervisor, either from RP College or an industry partner. Depending on CP complexity or multiple specialization requirements, the department headship may appoint a co-supervision team.

The duties and responsibilities of co-supervisor(s) are elaborated below:

- Plan for a convenient time for project implementation in workshops/labs without impediment to the usual training on other technical modules.
- Assist the student in the identification of useful equipment, materials and tools.
- Assist the workshop/lab-based project implementation as pre-indicated by the supervisor.
- Directing students through technical and advisory expertise and ensuring that the Capstone project end meets both the quality expectations and industrial/company needs
- Assessing the college/student interventions for additional resources and facilities more than what can be in the workplace.
- Assigning tasks, assessing their implementation, providing regular feedback to students and endorsing the progress tracker upon every task completion.
- Checking the form abidance of reports, as to the capstone project guidelines
- Recommending some proofreading assistance and other manuscript retouches aiming a professional technical writing of reports.
- Mentoring students about the research technicalities & principles, scientific content and support reviewing the same.

3.4 The Supervisor

- Validating a clear Capstone project plan and communicating to the department
- Facilitating the CP implementation through continuous guidance and orientation about effective ideation, technical support, resource people, companies/industry and stakeholders, resources, and norms.
- Maintaining regular communications and carefully checking the progress and providing regular feedback to students
- Ensure students' abidance to key research principles and specific RP guidelines/policy
- Propose suitable academicians to serve in the role of project co-supervision as project mentor, instructor or industry's technical advisor.
- Being part of the panel members and acts as a secretary who records all comments, recommendations and resolutions, and assures that they are further addressed accordingly.
- Check all the manuscripts before being forwarded to the defense panelists or library.

The supervisor should fulfill the condition of +1 academic qualification in comparison to the RQF level of the prospective graduate.

3.6 The defense panel

The members of the project defense Ppanel should be three academicians selected based on their areas of specialization and relevant experience. Unless under special circumstances, panel members are staff from the student's department or industry. They are chosen by the department headship with the college's research coordinator consultation. Members of the panel of examiners to be nominated are:

- The supervisor or his/her delegate co-supervisor; and
- Two (2) panel members whose research interest/teaching area or expertise falls under or close to the project theme.

The panelist members for the same capstone project should be retained throughout all project stages as long as possible. Their roles and responsibilities are:

- To read students' initial reports ahead of the presentation and come to the defense with a clear content understanding and improvement suggestions.
- To follow and assess the student's presentation and achievement, provide review comments and mark his/her deliverables
- To re-attend any further presentation seating, assess the improvement and re-mark revised deliverables.

The defense panelist should fulfill the condition of +1 academic qualification in comparison to the RQF level of the presenting prospective graduate. However, this condition may be overlooked for industry-based co-supervisors.

4. Manuscripts format

This section explains the RP norm in reporting the capstone project. However, the templates for capstone project reports with embedded formatting can be downloaded from RP website resources.

4.1 Format, Page Layout and appearance of project proposal and report

- **Paper:** The dimension of the project report should be in A4 size. However, the supervisor may opt for the insertion of a folded page of another size. The paper should be white in color, acid-free of a non-erasable type.
- **Length**: As to HEC recommendations, the maximum length for undergraduate engineering-related projects shall be 6,000 words. The minimum length shall normally be two-thirds of this limit. This count excludes ancillary content like tables, diagrams and appendices, references, etc. This norm can only be exceeded under the supervisors' rational guidance.
- **Margins**: The text should be 20mm demarcated from the top, bottom, and right-hand sides, while the left-hand margin should be not less than 25mm clearance. The capstone project report must be fully justified (i.e. even text stretch for left & right-hand margins).
- **Headings and subheadings:** They are aligned to the left-hand margin including the information falling under them.

Chapter headings can be aligned to the Left-hand margin or centered consistently. Each chapter starts on a new page. Chapter headings and main subheadings are typed in Lower-Case with the initial Capital letter of each word. They are bold, not underlined.

First-level heading, second and third-level headings must be defined with a particular set of font and spacing characteristics. In general, it is unlikely that fourth or fifth-level headings will be required in the final report. It is recommended to stick to three-level headings, it is advised not to extend that heading range to sub-subsections, unless recommended by the supervision member. If it happens, consider divisions of subsection and sub-divisions of division numbered under upper case letters and Arabic numerals, respectively. The following is a typical example:

1 Chapter 1 of the capstone project proposal/report
1.1 Section 1 of Chapter 2
1.2 Section 2 of Chapter 2
1.2.1 Sub-Section 1 of Section 2
A. Division A of Sub-section 1
i) Sub-Division i) of Division A
ii) Sub-Division ii) of Division A
B. Division B of Sub-Section 1
1.2.2 Sub-section 2 of Section 1
1.3 Section 3 of Chapter 1
2 Chapter 2 of the capstone project proposal/report
.....
.....

Legends (these are the figure and table identifications) should be emboldened and centered, but not enlarged.

- **Font type & size**: The "Times New Roman" font style will always be used with a font size: (i) Chapter Headings - Times Roman 15 pts., bold print and all capitals, (ii) Sections heading - Times Roman 13 pts., bold print and leading capitals, i.e. only the first letter in each word should be in capital, (iii) Subsections headings - Times Roman 12 pts., bold print and leading capitals, (iv) 12pts in the general body text and normal print. If necessary to fit the contents of a table on one page, a 10-point font size may be used; alternatively, the page may be printed in landscape mode. 10-point font size may also be used for footnotes, captions, figures, tables and other print outside the basic text.
- **Line Spacing**: Use 1.5 spacing between the regular text and quotations, double space for headings and Single line spacing in the general body text.
- **Paragraphs:** These should be blocked (no indentation on the first line) and separated by a single space or blank line. Right and left margins should be justified (giving a straight edge to the text on both sides).
- **Pagination and Footnotes**: The report must carry sequential pagination throughout, including appendices. Except for the title page, every sheet of paper must hold a number. The title page holds an unwritten lowercase Roman numeral of 'i' (i.e. counted but bears no page number); and the following preliminary pages start from ii, iii, iv, etc. These are all pages before the body of the text, for instance, the abstract, acknowledgements and table of contents. On the other side, all main text pages hold Arabic numerals (1, 2, 3, etc.).

  Set at the page's bottommost position, all page numbers should be on the button-centered margin of each page. No other marks should appear before, after or under the page number. Footnotes should be used sparingly. They should be typed in a single space and placed directly underneath on the very same page, which refers to the material they annotate.
- **Printing:** one side print for each page, dark and clear; only the title page should be printed in color on hard paper. The cover page is printed on it in the specified format. Information printed on the cover and the spine must be with good-colored letters. Special graphs or designs might be printed in color, if their readability requires so.
- **Binding:** The first CP manuscript submission for evaluation should be in temporary binding, i.e. hole-punching and spiral binding. However, the final submission should be in permanent hard-cover binding, i.e. comb binding not spiral binding.

- **Page breaks**: Introduced in sensible places and distinct sections, typically at the beginning of new chapters.
- **Tables and figures**: Figure titles should be centered below the specific figure whereas the tables are set at the leftmost side on the top of the specific table, without the space between the table and its title. The column lines should be hidden while keeping three horizontal lines as shown in Fig. 4.1. For both figures and tables, the identification numbers reflect the chapter and the numbering in the corresponding sequence order.

Table 4.1: The caption should be placed at the top leftmost side of the figure

SN	Column 2 title	Column 3 title
1		
2		
3		

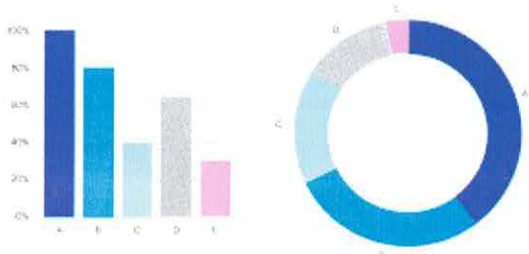

Fig. 1.1 The caption should be placed after the figure

Moreover, they must be mentioned within the text using their labels such as "table/figure 2.1 shows that …" Avoid using sentences like "table/figure below" or "table/figure above" since the indicative text can be relocated during the final manuscript retouches done to let the text fit well with the page entirety.

- **Symbols, Units and Equations**: Symbols or nomenclature used shall be defined. Standard symbols or acronyms normally accepted in engineering can be used. International system unit (SI) is recommended, and units should be inserted between blankets [].
  Equations should be numbered by means of Arabic numerals enclosed in parentheses on the right-hand margin. The numbering is with reference to chapters in which they appear (e.g.: KE=1/2 mv^2 (2.1) means that this formula is the first in chapter two). A hidden table of 2 columns and 1 row is convenient to keep the equation centered within the left column and place its number at the right-most position with the right column, as illustrated below.
  Initial table with borders:

$KE = \frac{1}{2}mv^2$	(2.1)

  Final table hidden borders:

$$KE = \frac{1}{2}mv^2 \qquad (2.1)$$

  Equations should be cited within the main text in full words or abbreviated as follows: Equation (1, 1) or Eq. (1.1), Equations (2.1) - (2.3) or Eqs. (2.1) - (2.3).

- **In-text Citation**: sources of information mentioned in the report text. E.g.: (Mugabo, 2024), or superscript of the citation number in the references list, such as EEE style.

4.2 Final report manuscript of the Capstone Project

The language to be used is formal English writing, as to words. After the Cover/title Page, there should be a blank page before the following prefatory content of which, the content directives can be found in online resources.

Prefatory content of the project report [Pages numbered using Arabic numerals]

i) Approval sheet
ii) Acknowledgement: A brief business-like thankfulness expression to those who have helped or supported in one way or another
iii) Abstract: The whole project in miniature. One-pager synopsis of the project report to allow the unacquainted reader for a swift brief picture of the project idea, objectives, methods and main conclusions.
iv) Table of Contents (the title page is not included)
v) List of Symbols and acronyms (if any)
vi) List of Tables
vii) List of Figures

Project report body [Pages numbered using Roman numerals]

The main report text broadly covers 3 components: (i) Introductory chapter(s), (ii) Chapters developing the main theme of the project work and (iii) Conclusion.

The specific number and naming of the chapters are suggested by the student with the supervisor's guidance. However, they should roll around the following content:

1. Introduction: Describe the problem investigated, summarize relevant research to provide context, key terms, and concept so the reader can understand the experiment.
2. Literature review: Narration of related selected works that insinuate about the CP contribution while helping with basics to the unacquainted reader. Move from general to specific – relate problems in the real world to your research.
3. Problem definition and requirement analysis: The problem inference of the research question(s) and analysis of the need or impact. Make clear links between the problem and the solution.
4. Materials and Methods: Also referred to as research methodology/approaches with involved materials and experimental design
5. Results: Presentation of findings or the developed products and associated technicalities/functionalities descriptions
6. Discussion: Corroborating your findings/product/technology to the existing knowledge and show your novelty and contribution...
7. Concluding remarks: Summarize the most important outstanding findings and outline the project's success when compared to initially set objectives
8. Recommendations: inference of recommendation for future enhancements
9. References/bibliography
10. Appendices

The supervisor's recommendation may eliminate, retain, add or merge any of those chapters. He can suggest for a summary at the end of each chapter as a recap of the completed chapter for a smooth landing on the next one. He may also rename the chapters as to the capstone project nature, e.g.: Design and Implementation may stand for results chapters and discussion can be replaced testing and deployment.

Format for References, Citations, and Quotations

- As for conference papers, Journal Article, books, book chapters in most of engineering fields; the recommended citation style for capstone projects in Rwanda Polytechnic is the American Psychological Association (APA) style. However, the IEEE citation style can be used under the supervisor's preference for reference management software such as Endnotes, Zotero, Mendeley, RefWorks, etc.
- Useful web-based resources are cited by the title, link and the date by which the information has been read online; all separated by commas.

Appendices: These should be sequentially numbered starting with: Appendix 1. Pagination continues from the main body of the document through the appendices. A good practice is to leave one Appendices title page between the main text and appendices.

4.3 Capstone Project proposal outline and contents

As for the project report body, the supervisor will work with the student to determine the chapters or use the existing guidance resources. The content hint rolls around the following: Title of the project, background, problem statement, rationale, novelty, research question and hypothesis, aim and objectives, a brief review of the literature, research methods, ethical consideration and consent form, budget and timeline, references.

[College header]

STUDENT'S CAPSTONE PROJECT PROGRESS TRACKER - [Academic Year]

[Project title]

Student name(s) : …….. **Registration number: ……**

Department: …….. **Program: ……..**

Supervisor: ……..

Co-Supervisor(s): …… **……**

No	Tasks	Start	End	Status and comments	Signature
1					
2					
3					
4					
5					

Note: Students should meet their supervisors at least once a week. Meetings can be physical or online depending on the whereabouts of students and supervisors (at the campus premises or industry). This form is periodically presented to the department headship (once a month) and a comprehensive compilation should be submitted one week before the project report presentation.

[College footer]