



Handbook of Final Year Research Project/Industrial Training

Department of Computing and Information Systems
Department of Food Science and Technology
Department of Natural Resources
Department of Physical Sciences and Technology
Department of Sport Sciences and Physical Education

Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka

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Introduction

The final year research project/industrial training is a compulsory component of all degree programmes offered by the Faculty of Applied Sciences. It provides an opportunity for students to integrate knowledge and different types of skills and competencies gained in their studies throughout their previous semesters and to develop critical thinking. It is carried out as an independent work which is evaluated according to the highest academic standards. The project/training should be completed within a period of 15 weeks (one semester, full-time) and generally carries six or eight credits. The designations given to the research project/industrial training at the Faculty of are as follows.

- ❑ B.Sc. Special Degree in Food Science and Technology:
 - ⊕ FST 42801 Research Project/Industrial Training
- ❑ B.Sc. (Applied Sciences) Special Degree in Environmental Science and Natural Resources Management:
 - ⊕ NRM 42801 B.Sc. Thesis in Environmental Sciences and Natural Resources Management and Presentation
- ❑ B.Sc. (Applied Sciences) Degree in Environmental Science and Natural Resources Management:
 - ⊕ NRM 32410 B.Sc. Thesis in Environmental Sciences and Natural Resources Management and Presentation
- ❑ B.Sc. (Applied Sciences) Special Degree in Chemical Technology:
 - ⊕ PST 42801 Project Work: B.Sc. Thesis in Chemical Technology
- ❑ B.Sc. (Applied Sciences) Special Degree in Applied Physics:
 - ⊕ PST 42802 Project Work: B.Sc. Thesis in Applied Physics
- ❑ B.Sc. (Applied Sciences) Special Degree in Computer Science and Technology:
 - ⊕ PST 42803 Project Work: B.Sc. Thesis in Computer Science and Technology
- ❑ B.Sc. (Applied Sciences) Degree in Physical Sciences:
 - ⊕ PST 32801 Project Work: B.Sc. Thesis in Physical Sciences
- ❑ B.Sc. Special Degree in Computing & Information Systems:
 - ⊕ CIS 42647 Research Project or Industrial Training
- ❑ B.Sc. (Applied Sciences) Special Degree in Physical Education:
 - ⊕ PE 42861 B.Sc. Thesis in Sports Sciences and Management
- ❑ B.Sc. (Applied Sciences) Special Degree in Sport Sciences and Management:
 - ⊕ SM 42861 B.Sc. Thesis in Sports Sciences and Management

Contents and Assessment criteria

General Objectives and Learning Outcomes

The general aim of the final year research project/industrial training is for the students to acquire, develop and demonstrate the requisite knowledge, skills and attitudes/mindset to work independently after graduation. Therefore, to satisfy these requirements, the student shall

- ☑ develop and demonstrate in-depth knowledge in the chosen field of study for the research project and thereby contribute to the advancement of knowledge.
- ☑ demonstrate an ability to plan and execute advanced tasks within a given timeframe using suitable scientific methods.
- ☑ demonstrate an ability to identify, formulate, propose and implement solutions for complex issues arising in their relevant disciplines in a critical, independent and creative manner.
- ☑ demonstrate an ability to integrate the knowledge acquired from the core courses of the degree programme in a systematic and creative manner for research and development oriented tasks.
- ☑ demonstrate an ability to give a clear and cohesive account of and discuss orally (by means of a presentation) and in writing (by means of a report) his/her findings in a logical, clear and concise manner.
- ☑ be able to identify various sources of information, critically evaluate their relevance to the problem in question and to be able to use the correct forms of documentation to summarise them, in an independent manner.
- ☑ be able to defend results from laboratory/field experiments and the fundamental theories behind them in an oral presentation as well as in a well-structured technical report.

Components

The final year project comprises the following components.

1. Project proposal (this may be preceded by a Concept Note, at the discretion of the respective Department) and an oral presentation of it.
2. A mid-term progress review (at the discretion of the respective Department)
3. An end-term oral presentation
4. An end-term poster presentation
5. A written report (thesis) of the project work /training
6. An abstract for departmental and faculty level book of abstracts

A report (the loose-bound copy) should be submitted at least one week prior to the oral and poster presentation sessions. All reports must be written and presented in the English language. A copy of the final report will be filed in the departmental archives after the student makes the necessary corrections/changes in response to the supervisors' comments.

Supervision and supervisors

Each student is assigned a supervisor from the academic staff members of the Faculty (internal supervisor). The internal supervisor supports the student in his/her work to accomplish a report according to the guidelines and assessment criteria, within the given timeframe. The role of the internal supervisor is to be a continuous advisor during the project/training period and to monitor the progress and provide feedback on the potential problems and other issues arising during the work. However, because the project is an independent work, it is not the task of the internal supervisors to inform the students exactly how to improve their draft report, overall as well as in detail, since the project is an independent work. The internal supervisor therefore shall only attempt to improve the overall quality of the final report by providing comments and suggestions. However, it is the student's responsibility to plan and carry out the entire project/training. The draft project report needs to be submitted well in advance of the project presentation in order to receive a comprehensive feedback from the internal supervisor.

Each student is also assigned an external supervisor, who is the direct advisor of the student's work and is usually from the establishment/institute/company where the project is carried out. Therefore the external supervisor is an expert of their relevant industry/academic discipline. The student should regularly discuss the progress of his/her work with the external supervisor and obtain the feedback. It is the duty of the student to make sure that the external supervisor is fully aware of the project objectives. At the end of the project/training period the student's respective Department will obtain feedback from the external supervisor and this may also be considered during the final grading of the project. The external supervisor is also invited to take part in the research project presentation sessions.



The levels of commitment and accessibility of both the internal and external supervisors can vary greatly. Discuss your specific expectations with each of them at the earliest possible and keep them informed well in advance with about scheduling meetings in order to secure an appointment.



It is highly recommended to document all meetings with supervisors and in order to minimize the risk of misunderstanding, communicate and confirm all agreements in writing, for example via email.

Assessment

The final grade for the research project/industrial training is determined according to the departmental assessment criteria. Generally, all the required components of the project are examined separately and the cumulative marks will be used to determine the final grade. The Examination Panel/Committee appointed by each Department decides on the allocation of marks allocated to each required component of the final year project.

Guidelines for final year project components

Project Proposal

The Project Proposal is a very significant component of the proposed work. It is an informative piece of writing that reflects all the aspects of your research project. It should be properly structured and should outline the essential information regarding the proposed research project. The Project Proposal should contain a clear statement of the research question, goals and objectives, introduction (background, justification and rationale), a brief literature review, materials and methods, work plan, budget and references.

The overall aim of the research proposal is to produce a good action plan and develop a strategy to address your research problem in a systematic manner. Although the students should write the proposal themselves, it is best to discuss its contents with both the internal and external supervisors before submitting it. It is also important that the student carefully checks the proposal for typographical and spelling errors, consistency of style, and accuracy of references, before submitting it. A research proposal should contain text as well as figures and images, but it should normally not exceed five A4 pages (line spacing of 1.5). An example of a Project Proposal with the expected format is given in Appendix I.



The following web resources contain some useful tips and advices for writing undergraduate project proposals.

- ✓ <http://www.sc.edu/our/doc/Proposaltipshints.pdf>
- ✓ <http://nuwrite.northwestern.edu/communities/science-writing-community/srw/penny-hirsch-video-2009.html>



Plagiarism warning:

Plagiarism can be broadly defined as deliberately presenting someone else's ideas, findings, or work as one's own by copying or reproducing the work without proper acknowledgement of the source. It is the most common form of academic dishonesty and should be avoided.

No student therefore shall submit the exact words, ideas, images or data of another person as the student's own in any form of academic writing such as essays, thesis, project proposals, assignments, presentation or posters, etc within the context of the degree programme. This holds true for both the draft and the final project report.

The project proposal is examined in an oral presentation. The specific guidelines and instructions for the presentation will be given by the respective Department that appoints an Examination/Assessment panel.

Further Reading

- 📖 Writing a Research Proposal: A guide for Science and Engineering students (The University of Melbourne):
http://services.unimelb.edu.au/_data/assets/pdf_file/0006/471273/Writing_a_research_proposal_Science_Engineering_Update_051112.pdf

The Project Report

The project report, regarded as the final written output of your endeavour, is where you place the project work in context and should be written in English. A loose-bound copy must be submitted to the respective Department for assessment and grading, prior to the specified deadline (before the oral presentation). Penalties will be applied for late submissions. The comments of the supervisors and examiners must be addressed before producing the final hard copy.



Start writing the project report as you proceed with your work. Set up interim targets to complete each section and get them reviewed by the supervisors without waiting until all work is completed. It would be less burdensome for the supervisors to review the report section-by-section rather than going through the entire report. Once the entire report is complete, the supervisors can focus more on the contents and the consistency of the report.



Proof-reading your report during the final stage of production is very important and proof-reading your own work can be challenging; it usually takes longer than expected.

Structure of the Project Report

A project report may contain many sections and some recommended sections are outlined below.

Preliminary Pages:

- i. Cover page
- ii. Title page
- iii. Declaration
- iv. Dedication (highly personal and optional)
- v. Acknowledgments (the style is usually your own)
- vi. Abstract (maximum one page)
- vii. Table of contents
- viii. List of figures
- ix. List of tables
- x. Abbreviations and Symbols
- xi. Conversion Table (optional)

Body of the Document:

Chapter 1 Introduction

This chapter focuses on the background and overview of the study. A good introduction should include a clear statement of the nature of the project and its rationale where the research problem and its significance are justified. The limitations of the study can also be briefly discussed and the structure of the report can be outlined. The aims and objectives (main and specific objectives) of the project must be stated clearly at the end of this chapter.

Chapter 2 Literature review/Theoretical Framework

This chapter presents the underlying theoretical framework of the study. Thus, it justifies as to why the researcher selected the design to answer the particular research problem. Describe the work that has already been done, being critical where necessary. Summarize the main facts and conclusions of the previous studies, synthesizing to produce main themes, directions, contradictions, etc. It is interesting to point out those areas of the field that are still inadequately covered.

Chapter 3 Materials and Methodology

This chapter deals with the experimental/research design used to solve the problem. Hypothesis used (if any), sample, data gathering techniques (test, observations, interviews, check list, audio/video taping, photographs etc.), data analysis/interpretation techniques, materials/consumables/apparatus set up (if any). Ethical considerations can also be briefly described.

Chapter 4 Results and Discussion

This chapter is an account of your observations, measurements taken and/or data collected. Discuss the significance of the obtained results in relation to the original aims and objectives and to the previously published data.

Chapter 5 Conclusion and recommendations for further studies/future outlook

The major conclusions must be clearly stated in this chapter. Ideas or suggestions for future research may be presented based on the findings of the investigation that has been performed. A future outlook can also be included.

6. References

A complete and accurate list of references should be provided. It is very difficult for editors/proofreaders to fill in missing information on the author's behalf, or to check the spelling of names. Also check for the compatibility between the reference cited in the text and the references given in the list.

7. Annexes/Appendices:

Any materials that do not fit into the main chapters can be included in the appendices. For example, survey questionnaires, compilation of survey data, source code of a program, etc can be placed in the form of an appendix/annex.

General Guidelines on Layout and Style

- **Main Text:** Size should be 12pt in the *Times New Roman* font. General Spacing should be 1.5 lines and the font size will change as per headings of the chapters, sections, subsection and the main text.
- **Page Numbering:** Each page should be numbered at the bottom right hand corner using the numbering style specified for the preliminary pages and the body of the document.
- **Language:** You are free to use either British (UK) English or American English. However, consistency must be retained throughout the thesis. i.e. never mix British and American styles of spelling, etc. and be aware that British and American English do not only differ in the spelling, but also in the use of some prepositions and phrases.
- **Length of the report:** Approximately 50 A4 pages (~ 10,000 words, excluding appendices).
- **Page Margins:** The left margin should be 4.0 cm (1.5 inch) while the right, top, bottom margins should be 2.5 cm (1 inch). Title/Paragraph Margin: Chapter number and title should be centered. Subsection number should be aligned with the left margin. General alignment of the text in paragraphs should be "justified".
- **Page/Paragraph Breaks:** A new chapter must start on a new page. A subsection title should not begin on the last line of a page. A new paragraph should not begin on the last line of a page. (A new paragraph in the text is usually indicated by the insertion of a blank line or suitable space or by indentation of the first line).
- **Preliminary Pages:** these include the title page (the first right-hand page inside the cover), declaration of originality, dedication page, acknowledgements, abstract, table of contents and the list of tables / figures /symbols. Number them using small letter Roman numeric (i, ii, iii, etc). The first page is the Title Page. This page is counted as "i".
- **Body of the Report:**
 - * These include all chapters, references and appendices.
 - * Numbered using Arabic numeric (2, 3, etc).
 - * The first page of a chapter should be counted.
 - * Numbering of References continues from body text.
 - * Numbering of Appendices continues from references.
- **Numbering:** all chapters and their subsections must be numbered and chapters and Subsections must be titled.
Example:
 - Chapter 2 Title of Chapter
 - 2.1 Title of the subsection (second level)
 - 2.1.1 Title of the sub-subsection (third level)
 - 2.1.1.1 Title of the sub-sub-subsection (fourth level)

- **Tables and figures:** all tables and figures must be numbered with respect to the chapter using Arabic numerals. For example, Table 3.1 is the first table that appears in Chapter 3. The table number and title are given above the table while figure captions are placed below the figure.

Further Reading

- 🔗 Ken Hanson: Technical and scientific writing
<http://kmh-lanl.hansonhub.com/techwriting.html>
- 🔗 Mayfield Handbook of Technical and Scientific Writing
<http://www.mhhe.com/mayfieldpub/tsw/toc.htm>
- 🔗 Style points for Scientific Writing (University of Connecticut)
http://www.writingcenter.uconn.edu/pdf/Style_Points_for_Scientific_Writing.pdf
- 🔗 The Economist Style Guide
<http://www.economist.com/styleguide/introduction>

Reference Management

The degree project/industrial training report is a scholarly report in which the author must acknowledge all the sources; failure to do so could be considered as an act of plagiarism. A comprehensive reference list is necessary for you to trace your material and to enable any reader to review your work. You can use one of the two widely used styles to present your references and cite them appropriately i.e. the Harvard Style or the Vancouver Style. However, your supervisor should be able guide you in your selection of a particular style.

It is very convenient to manage references using a bibliographic and reference management tool such as EndNote, Mendeley, etc which keeps track all the references mentioned in the report.



To avoid any disparity between the list of references and the in-text references in the main text, complete your list of references as you proceed; not after word processing the entire report. This will save you a lot of time, especially when locating something that was read or accessed a long time ago.

Further Reading

General Guidance on Referencing Styles:

- 🔗 InfoSuss Referencing : University of Sussex Library
<http://www.sussex.ac.uk/library/infosuss/referencing/index.shtml>
- 🔗 Referencing and citation styles : University of Sydney Library
<http://libguides.library.usyd.edu.au/citation?hs=a>

Guidance on how refer to material on the Internet/World Wide Web:

- 🔗 American Psychological Association (APA) Style Guide: <http://blog.apastyle.org/>
- 🔗 Citing Medicine: The NLM Style Guide for Authors, Editors, and Publishers: <http://www.ncbi.nlm.nih.gov/books/NBK7277/>

Guidance on how to avoid plagiarism:

- 🔗 Viper: a free tool that can be used to avoid plagiarism
<http://www.scanmyessay.com/avoid-plagiarism.php>

Printing the Report

Students are generally required to produce three hard-bound copies of the report (self-copy, department/Internal supervisor's copy and External supervisor's copy). Contact the relevant Departmental office for specific advice on the exact number of copies. Use high quality A4 size paper (80 gsm) and print on a single side using a high quality printer (preferably a laser printer). Text and figures must be clear and legible. The report should be hard bound. For hard bound copies, the outer cover shall be in the Faculty colour (i.e. navy blue) with golden inscription (See Appendix II). The spine of the document should carry information as specified in Appendix II. Follow the rules and guidelines when using the University Logo.

A comprehensive digital copy of the project report should also be submitted to the departmental office, stored in two Compact Discs (CD-ROMs).



If you have color images, diagrams, photographs, etc, their final readability will depend on whether you print in colour or in black. Check their readability before producing the hard bound copy. It is also advisable to use high-resolution images, etc in order to improve readability after printing.

Oral Presentation

Presentation Structure

Students are required to prepare a 15 minute presentation. The oral presentation is usually followed by a discussion which can last for about 5 minutes. When you have finished presenting, members of the Examination Committee/Assessment Panel will usually discuss your work. There should also be time for questions from the rest of the audience. Students can prepare Power Point slides for the presentation. The slides should be readable and suitable to an academic audience. Discuss the contents with your supervisors.

Delivery of Presentation

The explanations/findings should be convincing and be theoretically sound and the contents should be well organized. Be confident and well prepared with your presentation. The delivery should proceed with a good pace, so that the audience is able to listen and follow the presentation. Some tips for improving your presentation are given below.

1. Practice good eye contact.
2. Emphasis: use body language, pay attention to gestures and manage your pitch to highlight important points.
3. Stand straight and face the audience.
4. Speak good and clear English.
5. Make sure that the slides are clear (not blurry), tidy (not messy/not overloaded) and visible/legible (use a suitable font and size).
6. The slides must be concise (short points/phrases yet thorough coverage).
7. Show diagrams (figures/images, graphs, block diagrams, flowcharts, etc.) in order to cut down explanations as well as to aid the explanations. The images should be visible even to those who are seated at the back of the room.



Practice the presentation in the room which is allocated for the presentation. Test how loudly you should speak and how to move around in the room. If you have audio or video clips in your presentation make sure that the necessary equipments work properly.

Assessment of student's performance during the Question & Answer Session

The student should be

- ✓ Able to answer questions accurately and with sufficient details.
- ✓ Able to answer questions coherently and confidently.
- ✓ Able to answer basic/fundamental questions within the areas/scopes of the project.
- ✓ Demonstrate good communication skills and be able to relate the answers to examples, slides, data, etc.

Further Reading

- 📖 Hawker, C.J. Effective Presentations - A Must. *Angew. Chem. Int. Ed.* 2013, 52, 3780 – 3781 Available from: <http://onlinelibrary.wiley.com/doi/10.1002/anie.201209795/pdf>
- 📖 How to make an effective, professional research presentation
http://www.gvsu.edu/cms3/assets/B4A31AF5-FE18-57A3-0B2C38E8A615588B/how_to_make_an_effective_professional_research.pdf

Poster Presentation

The poster is a visual presentation of your research findings, so it must be self-explanatory as much as possible. In other words, it should be understandable by the viewer even without a verbal explanation. Students should ensure that they stand by their posters at their allocated times during the Poster Presentation Session to discuss and answer questions regarding their posters.

Poster Size:

The dimensions of the panel provided for displaying posters are 75 cm (width) x 90 cm (height), so ensure that your poster does not exceed these dimensions. These poster panels will accommodate two posters on either side.

Poster Panel Allocation:

A numbered panel will be allocated for each poster and the respective department will inform you of your number before or during the poster set up time. Ensure that your poster is fixed on the panel well in advance of the poster presentation session.

Further Reading

- 🔗 American Chemical Society- some tips for effective undergraduate poster presentations
<http://www.acs.org/content/dam/acsorg/education/students/college/acsmeetings/your-first-research-presentation.pdf>

General Guidelines for Poster Production

As mentioned earlier, the poster should be self-contained and self-explanatory as much as possible. This allows the examiners and different viewers to proceed on their own pace, while the author is free to answer questions and discuss particular points regarding their posters. In order to enhance the visual appeal of a poster it should be kept simple and clear and contain a mixture of text and graphics (be artistic).



It is the viewer, not the author, who decides how much time is spent reading each poster. Therefore, be creative in your design. If you want to retain the viewers for a long time, make an interesting and attractive poster.

Poster Layout:

The contents may be hand-written or digitally printed (e.g. by a laser printer) using an appropriate poster paper or board. The matt finish is preferred rather than a glossy finish. It is recommended that the poster contents be arranged in columns (i.e., vertically) rather than rows (i.e., horizontally). Normally, the introduction should be placed at the upper left and a conclusion at the lower right. The important point to remember is that the contents must be arranged in such a manner that it has a good flow and the poster should be easily understood.

Illustrations:

Figures should be comprehensible from a distance of at least 5 feet, so use clear graphics containing large fonts, and an easily readable typeface. Each figure and table should have a heading of one or two lines and additional information should be placed below it. Photographs should be well focused, contain sharp images and have a good contrast. If necessary, one may indicate the scale.

Text:

Be short and precise, but avoid being too narrative. Use large typeface in short, separated paragraphs. Numbered or bulleted lists are effective ways to convey a series of points. Do not set entire paragraphs in uppercase or boldface type.

Titles and Fonts:

Titles and captions should be short and easy to read, in a sans serif font preferably. Use large lettering as this means a number of people can read the poster from a distance without overcrowding. The caption of your poster should carry the abstract title, authors' names and their affiliations.

Poster orientation:

Posters must be oriented in a "portrait" (vertical) position.

Guidelines for the preparation of Abstracts

The abstract is a summary of your degree project. It is a mandatory requirement to include your abstract in the booklet of abstracts prepared by each department for the Annual Research Presentation Session. It must be submitted to the departmental coordinating editor, who prepares the booklet of abstracts. Specific guidelines for formatting the abstract are given in Appendix III.

Appendix I Sample Format of a Project Proposal

1. Project Title: should be brief and descriptive.

2. Institutional Affiliation: the institution where the proposed study will be carried out.

3. Project Personnel:

3.1 Internal Supervisor: Name, affiliation and contact details

3.2 External Supervisor: Name, affiliation and contact details

3.3 Research Student: Name, affiliation and contact details

4. Introduction:

This section is a generic preamble of the proposed work, which provides an overview and a clear statement of the proposed study. Introduction can further be divided into two sub sections.

4.1 Background: This section presents and summarizes the research problem that will be solved and the approach to be used to solve that problem. The background should properly describe the conceptual and theoretical basis of the proposed study. Relevant references and previous work must be cited in order to support the research statement of the proposed study.

4.2 Rationale and Justification: In this part, the research problem must to be justified by stating and reasoning out why it is an interesting study and why it is important to do this study. The benefits or the findings of the proposed study (any novel ideas and/or contributions) and the future directions are also briefly discussed here.

5. Overall Objective:

This is the focus of the study, so it should be a succinct statement that describes what is intended to accomplished by the study.

6. Specific Objectives:

Specific objectives should assist and should be relevant to the overall objective and should be achievable within the given timeframe. Specific objectives are measurable (outcome-based) activities to achieve the overall objective of the study; the end points envisioned for the proposed project.

7. Experimental Plan/Project Design:

This section summarises steps taken to achieve the stated objectives of the project. This differs according to type of research or the project being proposed, for example, a sequence of laboratory experiments/ analyses, field trials, case studies, computer simulations, etc., that together lead to the accomplishment of the project objectives can be described here.

7.1 Materials:

- List the materials required for study including sources of data set(s), etc.

7.2 Apparatus/equipment and instruments:

- List the major apparatus/equipment and instruments required for the study.

7.3 Software tools:

- List the software tools that will be used for the study (if any).

7.4 Methodology:

- The experimental design is outlined here, with a sufficient description on proposed experiments or investigations and techniques. In addition, include the study area, study population, sample and sampling technique and the data collection methods (interviews, surveys, observations, measurements, etc).
- Include any calculations, calibration graphs, mathematical models, etc that will be used.
- Any other considerations such as ethical aspects of the study can also be mentioned. Whether ethical clearance that has already been obtained or whether informed consent has been obtained from the subjects and how to maintain the confidentiality of gathered data (especially in the case of sensitive data), etc can briefly discussed (The relevant Department will provide the necessary guidelines for obtaining ethical clearance).

8. Data analysis:

The statistical techniques and other methods that will be used to analyze data and the way of presentation of the data (pie charts, bar charts, graphs, etc) can be briefly described here.

9. Time duration: Specify the start and end dates

10. Project Timeline/Work plan:

Given the facilities and resources required, it is required to provide a rough time line for the completion of the proposed work to show that the project is achievable. Use a Gantt chart format as given in the following example to show the key activities along with their time durations.

Activity	Time duration (in weeks)														
	Month 1				Month 2				Month 3				Month 4		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Literature survey															
2. Preparing project proposal															
3. Preliminary study on the technical aspects															
4. Preliminary study on methods															

Appendix II Formatting for Cover Page, Spine Column, Title Page and Logo

FORMULATION AND DEVELOPMENT OF A HERBAL YOGHURT INCORPORATING KEHIPITTHAN (*Cyclea peltata*) AS A SUBSTITUTE FOR GELATIN AND STUDYING ITS QUALITY CHARACTERISTICS

Letters : Block Capital Letters, Bold
Font : Times New Roman, size 14
Font colour : Gold (No embossing)
Line spacing: 1.5 lines
Alignment : Center

By
D.M.T.H. Rathnayake }

Letters : Sentence case , Bold
Font : Times New Roman, size 12
Line spacing: single
Alignment : Center
Font colour : Gold (No embossing)

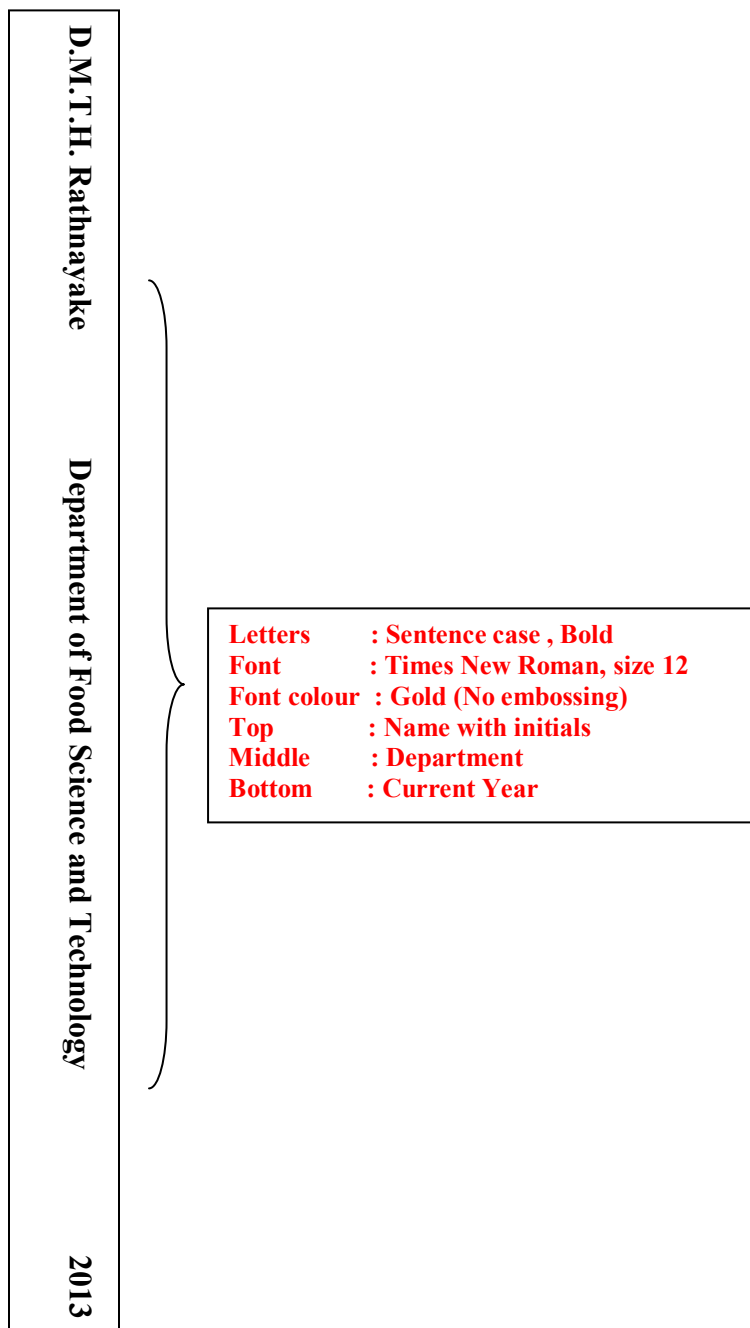
Department of Food Science and Technology
Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka
Belihuloya

2013

Page margins : Top - 1"
: Bottom - 1"
: Left - 1"
: Right 1"
Colour of page : Navy blue

Letters : Sentence case , Bold
Font : Times New Roman, size 12
Line spacing: single
Alignment : Center
Font colour : Gold (No embossing)

Spine column



**FOUMULATION AND DEVELOPMENT OF A HERBAL YOGHURT
INCORPORATING KEHIPITTHAN (*Cyclea peltata*) AS A SUBSTITUTE
FOR GELATIN AND STUDYING ITS
QUALITY CHARACTERISTICS**

Letters : Block Capital Letters, Bold
Font : Times New Roman, size 14
Font colour : Black
Line spacing: 1.5 lines
Alignment : Center

By
D.M.T.H. Rathnayake
(06/AS/061)

Letters : Sentence case , Bold
Font : Times New Roman, size 12
Line spacing: single
Alignment : Center
Font colour : Black

Research project report is submitted in partial fulfillment of the requirements for the
Bachelor of Science (Special) Degree
In
Food Science & Technology

Letters : Sentence case
Font : Times New Roman, size 12
Line spacing: Single
Alignment : Right
Font colour : Black

Letters : Sentence case
Font : Times New Roman, size 12
Line spacing: 1.5 lines
Alignment : Center
Font colour : Black

Department of Food Science and Technology
Faculty of Applied Sciences
Sabaragamuwa University of Sri Lanka
Belihuloya

May 2013



Size;
Left to right – 7 cm

(Do not resize! Use the
standard dimensions)

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Letters : Sentence case , Bold
Font : Times New Roman, size 14
Line spacing: Single
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Appendix III Abstract Format and Layout

**Title: Uppercase,
Times NR, 11pt,
Bold, Centered**

**DETERMINATION OF FACTORS THAT AFFECT ON DISPERSION OF SO₂
AND NO₂ GASES IN THE ATMOSPHERE –
A CASE STUDY IN WESTERN PROVINCE OF SRI LANKA**

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**Authors: Times NR,
11 pt, centered**

**Affiliations: Times NR,
10pt, italic, centered**

Urbanization and infrastructure development in cities cause air pollution, due to pollutants released by these domestic activities, vehicles, industries, etc. But the dispersion of air pollutants in the atmosphere is governed by meteorological (rainfall, wind direction, wind speed, temperature, humidity, etc.) and environmental (functional zones, green areas, relief) factors. The prime aim of this study is to determine the spatial variation of Sulphur dioxide (SO₂) and nitrogen dioxide (NO₂) in the atmosphere in Western Province of Sri Lanka and to examine their dispersion in relations to rainfall, green areas, water bodies, and elevation.

Western province consists of three districts, where many development activities are being undertaken. It covers about 5.7 % (3683km²) of the total land extent in the country. About 60% of the vehicular fleet in Sri Lanka operates in the Western province. Average vehicle population growth is 12 % per annum. Seventy percent of the industries in the country are located in the western province, which include prime SO₂ and NO₂ emission sources such as; thermal power plants, oil refineries, and harbor. Therefore, it has become very important to determine the level of air pollutants and to study their dispersion pattern. Hundred and seven locations were selected covering the Colombo, Kalutara and Gampaha districts in the Western Province. Passive samplers were installed in these locations for a period of three months from September to December 2009. SO₂ and NO₂ were analyzed by colorimetric and turbidimetric methods. To facilitate the study, concentrations of SO₂ and NO₂ were analyzed based on available 1: 50 000 digital topographic maps using Arc-GIS 9.2 software.

This preliminary study revealed a positive relationship between the SO₂ and NO₂ dispersion pattern with the rainfall, water bodies, and vegetation cover. However, to get more conclusive results, it is recommended to carry out further studies considering environmental and climatic factors as well. Spatial analysis results depicts the average NO₂ concentrations in Gampaha, Colombo, and Kalutara district are 23.98µg/m³ (n=28), 28.60 µg/m³ (n=48), 13.24 µg/m³ (n=31) respectively and average SO₂ concentrations in Gampaha, Colombo, and Kalutara district are 11.24 µg/m³ (n=28), 29.60 µg/m³ (n=48), 11.24 µg/m³ (n=31).

Key words: Urbanization, Air pollution

Total Number of words: 350
Between paragraphs: single line spacing
Paper size: B5
Margins: top, bottom, right = 0.8" left = 1"
Key words: max. five keywords