

**Information Processes & Technology**

Major Project Portfolio

Requirements and Design Report

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# **Introduction**

This report documents the requirements for producing a diverse multimedia product that will provide digital multimedia content for Staff and Students at St Pius X College for the purpose of supporting and encouraging teaching and learning, particularly in high order concepts and skills, on the subject of Physics.

Included in this document will be a Requirements Report including a clear statement of the system's purpose, a set of concrete objectives that will function co-operatively to achieve the system's purpose, and a timeline of tasks needed in each stage of this project to complete this task.

Following the Requirements Report will be a Design Report. This report includes details of each stage of the implementation and the expected deliverables from each stage.

# 

# **Requirements Report**

## System Purpose / Client Needs

The purpose of the system is to provide a diverse multimedia product that will provide digital multimedia content **for Students at St Pius X College** (1). studying for the HSC for the purpose of supporting and encouraging teaching and learning, particularly in high order concepts and skills (2), on the subject of HSC Physics.

Therefore, the Target Audience/Key Users of the system are **HSC Students at St Pius X College.**

In Physics, the main area that will be covered in this product will be the unit on **Advanced Mechanics** (3), including **Projectile Motion** (4), **Circular Motion** (5) and **Motion in a gravitational field** (6).

Therefore Skills/Knowledge Includes the HSC Physics unit on Advanced Mechanics (3), this includes the subtopics of:

* **Projectile Motion** (4)
  + Projectiles Launched horizontally
  + Projectiles launched obliquely
* **Circular Motion** (5)
  + Circular Motion
  + Circular Motion on a Banked Track
  + Work and Energy
  + Torque
* **Motion in a Gravitational Field** (6)
  + Gravity
  + Satellite Motion
  + Gravitational Potential Energy

It is recognized that Students will have a variety of different learning styles and to engage and entertain, as well as enable thorough and wholistic learning, the system will need to provide content in variety of multimedia elements such as **text** (7), **video** (8), **audio** (9), **interactive quiz**, (10) and **images** (11) for each subtopic of Advanced Mechanics.

The system will need to be accessible from different locations on different devices and easily modified and deployed to Students.

### 

## Social & Ethical Issues

The following are the Social & Ethical Issues that will be addressed in this Project:

* **Ergonomics**
  + Positive
    - Usability
    - Accessibility
    - Consistency of Design
    - Appropriate use of fonts
    - Appropriate use of white space
    - Forgiving system
    - Colour must be user judiciously
  + Negative
    - Screen can cause eye strain
    - Repetitive movements can cause strain
* **Copyright** 
  + Positive
    - Content needs to be attributed properly
    - No Copyright laws can be broken
    - All content must either be original or used with permission
  + Negative
    - Breach of Copyright can lead to lawsuits
    - Breach of copyright is unethical
* **Security**
  + Positive
    - All users must be authenticated
    - Information can only be accessed by students who prove their identity by logging in
    - Use of sessions may hinder security
  + Negative
    - Unauthenticated users can pirate the system
    - Un-Authentication leads to people taking advantage of the system
    - Could increase the chance of hackers hacking the system and stealing information
* **Reliability of Data**
  + Positive
    - Data must be up to date (according to the HSC Syllabus)
    - Data must be relevant to the syllabus
    - Data must be timely
  + Negative
    - Unreliable data is unethical
    - System is responsible for school student’s education
* **Privacy**
  + Positive
    - User’s private information must not be stared
    - Steps must be taken to ensure all private information is secure
  + Negative
    - Information could be sold
    - Unauthorized access to Private information is unethical
* **Equity**
  + Positive
    - non-gender specific colouring
    - appropriate font size
    - overuse of colour for colourblind users, especially blue and red combinations
  + Negative
    - Could cause racial disagreements
    - Could cause gender disagreements
    - Could sway the education of a particular gender
* **Work Practices**
  + Positive
    - Seek to engage users as to assist with study focus
  + Negative
    - Deskilling
    - Bad study habits
* **Changing Nature of Work**
  + Positive
    - System will be used for digital multimedia content, may be helpful for students who have missed class; however, it must not replace the teacher’s job by having knowledge in too much depth
    - Changing the way students of St. Pius X College study
  + Negative
    - Deskilling
    - Ruining study habits
* **Relationships between participants**
  + Positive
    - System should encourage the sharing of information between students
    - System should allow students to help each other and learn together
  + Negative
    - Information causes power differences
* **Design**
  + Positive
    - inclusive design
    - Appropriate use of colour
    - Appropriate use of white space
    - Aligning of screen elements
  + Negative
    - eye strain
    - limb strain

## System Objectives / Requirements of System

To address the needs of the key users, in this case the HSC Students of St. Pius X College, the system will need to be secure a website in which students’ login (1) and locate the information on the Physics topic they wish to study (2). It will be web-based to enable easy modification, management and deployment (3).

The multimedia content to be included in this product to support purpose (1) of the system include

For Each Subtopic:

* Projectile Motion (4)
  + YouTube Video - on Projectile Motion– this will help summarise the topic of Projectile Motion and slightly entertain students (8)
  + Projectile Motion Image Gallery – Documenting the practical uses and theory of Projectile Motion (11)
  + Text Information on Projectile Motion – This will assist in learning the content (7)
* Circular Motion (5)
  + YouTube Video - on Circular Motion– this will help summarise the topic of Circular Motion and slightly entertain students (8)
  + Circular Motion Image Gallery - Documenting the practical uses and theory of Circular Motion (11)
  + Text Information on Circular Motion– This will assist in learning the content (7)
* Motion In a Gravitational Field (6)
  + YouTube Video - on Motion in a Gravitation Field – this will help summarise the topic of Motion in a gravitational field and slightly entertain students.
  + Motion in a Gravitation Field Image Gallery - Documenting the practical uses and theory of Motion in a Gravitational Field (11)
  + Text Information on Motion in a Gravitational Field This will assist in learning the content (7)
* Advanced Mechanics Summary (4), (5), (6)
  + Advanced Mechanics Quiz - this will help Students to check their learning on the Advanced Mechanics unit and enable them to identify areas of learning that need further study or investigation, this will be hardcoded. (10)
  + YouTube Video – A summary on Advanced Mechanics – this will help summarise the topic of Motion in a gravitational field and slightly entertain students (8)

## 

## Social & Ethical Issues Addressed

How will the system address the above issues?

* **Ergonomics**
  + Usability
    - Make it accessible over multiple locations
  + Accessibility
    - Make it accessible over multiple locations
  + Consistency of Design
    - Follow simple rules with UI and navigation
  + Appropriate use of fonts
    - Use a sans-serif font
  + Appropriate use of white space
    - Use white space judiciously
  + Forgiving system
    - Allow actions to be undone
  + Colour must be user judiciously
    - Have a simple colour scheme
  + Screen can cause eye strain
    - Don’t use too many changing colours and have a consistent colour scheme
  + Repetitive movements can cause strain
    - Have simple movements
* **Copyright** 
  + Content needs to be attributed properly
    - Attribute all copyrighted multimedia 0r fruits of mental labour
  + No Copyright laws can be broken
    - Attribute all copyrighted multimedia 0r fruits of mental labour
  + All content must either be original or used with permission
    - Attribute all copyrighted multimedia 0r fruits of mental labour
  + Breach of Copyright can lead to lawsuits
    - Attribute all copyrighted multimedia 0r fruits of mental labour
  + Breach of copyright is unethical
    - Make original material
* **Security**
  + All users must be authenticated
    - Username and password login
  + Information can only be accessed by students who prove their identity by logging in
    - Login page
  + Use of sessions may hinder security
    - Use php sessions
  + Unauthenticated users can pirate the system
    - Username and password login to track who has logged in
  + Un-Authentication leads to people taking advantage of the system
    - Make sure to authenticate users with a username and password
  + Could increase the chance of hackers hacking the system and stealing information
    - This can be combatted by building parameterized queries.
* **Reliability of Data**
  + Data must be up to date (according to the HSC Syllabus)
    - Get data from the syllabus and use recent multimedia
  + Data must be relevant to the syllabus
    - Get data from the syllabus
  + Data must be timely
    - Get data from the syllabus and use recent multimedia
  + Unreliable data is unethical
    - Make sure all data used is reliable (check it)
  + System is responsible for school student’s education
    - Make sure all data used is reliable (check it)
* **Privacy**
  + User’s private information must not be stared
    - Use database views
  + Steps must be taken to ensure all private information is secure
    - Authenticate users
  + Information could be sold
    - Never share users’ private information
  + Unauthorized access to Private information is unethical
    - Authenticate all users and take advantage of database views
* **Equity**
  + non-gender specific colouring
    - Use a lot of blacks and whites
    - Have a specified colour scheme
  + appropriate font size
    - User h1, h2 and h3 font sizes
  + overuse of colour for colourblind users, especially blue and red combinations
    - don’t use red and blue colour combinations
  + Could cause racial disagreements
    - Create a culture unspecific UI
  + Could cause gender disagreements
    - Create a gender unspecific UI
  + Could sway the education of a particular gender
    - Create a gender unspecific UI
* **Work Practices**
  + Seek to engage users as to assist with study focus
    - Use videos and interactive multimedia types
  + Deskilling
    - Ensure topic information isn’t replacing the teacher’s job
  + Bad study habits
    - Ensure topic information allows for
* **Changing Nature of Work**
  + System will be used for digital multimedia content, may be helpful for students who have missed class; however, it must not replace the teacher’s job by having knowledge in too much depth
    - Summarise content
  + Changing the way students at St. Pius X College study
    - Summarise Content
  + Deskilling
    - Summarise Content
  + Ruining study habits
    - Allow content to be for studying not first-time learning
* **Relationships between participants**
  + System should encourage the sharing of information between students
    - Allow system to be accessed in multiple places
  + System should allow students to help each other and learn together
    - Allow system to be accessed on multiple devices
  + Information causes power differences
    - System must have disability support
* **Design**
  + inclusive design
    - Inclusive colour scheme
  + Appropriate use of colour
    - Judicious use of UI colour
  + Appropriate use of white space
    - Judicious use of white space in UI
  + Aligning of screen elements
    - Align all screen elements as to satisfy user
  + eye strain
    - Have judicious use of colour within the UI
  + limb strain
    - remove the need for repetitive movements

# **Design Report**

## Development Methodology

We have considered different **Development Approaches** to this project, but in the end, It was decided that the best approach for building and delivering the system would be in phases using **Agile Methodology** of development. This is due to the following reasons:

* The system is modular in nature, therefore Agile (consisting of modules is appropriate (1).
* Makes availability for student and teacher involvement easy (2)
* This is a web-based system, which easily allows for agile implementation (12)
* Data must be timely, agile allows for last minute data updates (4) (5) (6)
* Agile Implementation allows for implementation of changing view of higher order thinking (2)
* Agile allows for easy modification, management and deployment (12)
* Is a very realistic approach to software development
* Teamwork is Encouraged between developers and clients
* System Functionality can is developed rapidly and is easily demonstrated
* Low Resource Requirements as is needed for students’ computers
* Easy to fix or change requirements on the fly
* Has few rules and documentation can be easily used
* Little to no planning required
* Agile is easy for project managers to manage
* Developers have a large amount of flexibility when developing the system
* A Waterfall Approach is Inappropriate Because:
  + No working software is produced until late during the life cycle (which is bad as students need HSC information)
  + High amounts of risk and uncertainty (students need stability)
  + Not a good model for complex and object-oriented projects like this system
  + It is difficult to measure progress within stages.
* A Prototyping approach is Inappropriate Because:
  + Too much dependency may be placed on the prototype
  + Practically, prototyping may increase the complexity of the system
* A RAD approach is inappropriate Because:
  + More management complexity
  + A High dependency on modeling skills is needed
* An End User approach is inappropriate because:
  + Not for one user
  + Requires Tech skills
  + Product to be used by multiple people

We will review this development approach at the end of the project and comment on the suitability of this best approach.

The system will be delivered in two phases. Each Phase will take around 2-3 weeks - deliverable dates are given below

### Project Deliverables

1. This Requirement Report - DUE Term 2 Week 2 (28/03/2022)
2. Phase 1 - Interim Deliverable - DUE Term 2 Week 6 (03/05/2022)
3. Phase 2 - Final Deliverable - DUE Term 3 Week 1 (24/06/2022)

Below is a simple Gant Chart to support this list of deliverables:

A picture containing timeline

Description automatically generated

### Features Deliverable

The planning phase will include the following:-

* This Requirements Report documenting
  + The Systems Purpose
  + Social and Ethical Issues
  + System Objectives/Requirements
  + How the Social and Ethical Issues will be addressed
  + The Chosen Development Methodology and its justification
  + List of Project Deliverables and timings.
  + Features of such deliverables

The first phase will incorporate the following main objectives/features:

* Database Design to support the Quiz, login and store users
* Website infrastructure setup
* The website will include:
  + Information Guides
  + The Projectile Motion Topic
    - YouTube Video - on Projectile Motion
    - Image Gallery on Projectile Motion
    - Text Information on Projectile
  + The Circular Motion Topic
    - YouTube Video - on Circular Motion
    - Image Gallery on Circular Motion
    - Text Information on Circular Motion
* Test Plan for testing the implemented features
* Documentation of feedback from test results/ Summary of Test Results

The second phase will incorporate the following main objectives/features:

* Fixes/Enhancements raised from Testing in previous phase
* Additional Content:
  + Quiz
* New Topics
  + Motion In a Gravitational Field
    - YouTube Video - on Motion in a Gravitation Field
    - Image Gallery on Motion in a Gravitation Field
    - Text Information on Motion in a Gravitational Field
  + Advanced Mechanics Summary
    - Quiz on all of Advanced Mechanics
    - YouTube Video – A summary on Advanced
* The Final product (made up of first phase along with above features)
* Final Test Plan/Report for tests on the additional and new features and fixes
* Product Evaluation Report