PROJECT MANAGEMENT
LECTURER RESOURCE DOCUMENT 2014
(First edition: 2013)

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DID YOU KNOW?

There are two (2) IIE websites available that lecturers may find useful:

www.iieconnect.co.za

This website provides discussion forums, in which you can interact with lecturers from all the brands as well as faculty members from The IIE to share information, suggest content, discuss module specific issues and find announcements related to the online supplementary content for your students, and generally interact and network.

IIEConnect is also where you can provide feedback, as often as you like, on the modules on which you lecture. Good ideas and strong impressions fade with time and your contribution will be much less detailed if you only share this at the end of the module. We all want the same thing – so the more you can tell us about the module, the more we will be able to make the changes that need to be made!

www.facultybytes.co.za
or
www.facultybytes.net

This website offers a space in which you can publish research articles or practice papers.

Student Portal

The full-service Student Portal provides students with access to their academic administrative information – this includes online calendars, timetables, academic results, module content, financial accounts, etc. It also includes online Module Guides or Module Manuals, assignments and supplementary online materials.

Please encourage your students to engage with the supplementary online materials that are made available to them via their Student Portals.

SAM Admin Portal

The SAM Admin Portal interacts directly with the Student Portal in real time. As a lecturer you have access, via the SAM Admin Portal, to the module offers or classes that you teach. Just as students do, you have access to the Module Information page, which displays the 'Module Purpose' and 'Textbook Information' including online 'Module Guides' or 'Module Manuals' and assignments for the student and the 'Lecturer Resource Guide' for each module offer or class that you teach. For certain modules, electronic supplementary material is available to you via the 'Supplementary Module Material' link. By downloading relevant software you can view, print and annotate these related PDF documents. You can also use the 'Module Discussion Forum' to discuss module topics with your module offer or class such as any supplementary materials, ICE tasks, etc.

IIE Library Online Databases

The following Library Online Databases are available to lecturers. Please contact your librarian if you are unable to access any of these.

EBSCOhost

This database contains full text online articles.
http://search.ebscohost.com/
User name and password: Please ask the librarian

Inmagic

The Online Public Access Catalogue. Here you will be able to search for books that are available in all the IIE campus libraries.
https://library.iie.ac.za/InmagicGenie/opac.aspx
No password required

SABINET

This database will provide you with books available in other libraries across South Africa.
http://reference.sabinet.co.za/sacat
User name and password: Please ask the librarian

e-Brary

This database provides access to full text online books, some of which form part of the IIE recommended reading lists.
http://site.ebrary.com/lib/iieza
Password: Use your Employee Number

1 Introduction for the Lecturer

The prescribed textbook for this module is *Project Management Techniques: College Edition* by Rory Burke. The complete course is based on the textbook so students must have a copy if they are to be successful.

It is essential to encourage students to access a wider range of references and to read around the subject – Project Management is a subject that is constantly changing and developing and only by exploring recent developments can students truly develop good foundation knowledge of the subject.

To this end, many additional resources are referenced throughout this guide, for you as the lecturer and directly for the students.

Project Management is a very practical management science, therefore it is essential to continuously refer students to real world situations and case studies to enable them to apply the academic knowledge they are attaining. Again, a number of resources and activities are identified in this guide to assist you.

Encouraging the students to read about large infrastructure projects throughout the world in newspapers, technical magazines and academic literature will not only improve the students' knowledge of this management science, but will also increase their enjoyment of the subject. Use of digital media such as YouTube and relevant websites will also enhance the learning process.

Table of Contents

Using this Guide

This guide has been developed to support your use of the textbook prescribed for this module. There may be occasions when the textbook does not provide sufficient detail regarding a particular idea or principle. In such instances, there may be considerable additional detail included in the guide. However, this guide should not be used as a stand-alone textbook, as the bulk of the information that you will need to engage with will be covered in the prescribed textbook.

In addition, each Learning Unit in this guide could contain three (3) different types of engagement, referred to as Interactive Work Spaces, as listed below:

1. *Izimvo* Exchange – *Izimvo* is an isiXhosa word for ideas and so this is the exchanging or sharing of ideas. These are in-class debates or discussions linked to the subject matter and/ or current affairs.
2. Activities – These are varied interactions in which you can engage with the subject matter.
3. Revision Exercises – These are questions/ tasks based on theory.

The purpose of the Interactive Work Space is to provide opportunities for you to engage with the subject matter in the Learning Unit both in and outside the classroom in preparation for assessments. In different modules there would be more or less emphasis on the different types of engagement, depending on the nature and objectives of the particular module.

Introduction

Todays companys, governments and non profit organisations are recorgnising that to be successful, they need to be conversant with and use of modern project managemnet techniques. Moreover individuals are also realising that to remain competitive in the workplace they must develop skills to become good project team members and project managers. Therefore based on this argument,this module introduces to sudents the foundational and practical knowledge of Project Management, the characteristics of the main project phases and the tools used in managing projects. It further provides knowledge of the four phases of Project Management; sourcing a viable project, planning resources and budgets, executing the project and closing the project by having the client sign off on it. This with the aim of enabling students to be able to

- Analyse the lifecycle requirements of a project for implementation and execution.
- Apply the Project Management framework in the design of a project.
- Utilise the development life cycle as applied in Project Management for the inception and design of a project.

Module Resources	
Prescribed Book for this Module	Burke, R. 2013. *Project management techniques: college edition.* 2nd edition. Ringwood: Burke Publishing. ISBN: 9780987668301. *Please note that this module guide is intended to support your learning – the content of this module is in the prescribed textbook. You will not succeed in this module if you focus on this module guide only.*
Recommended Additional Reading	Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing. Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom. Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.
Digital and Web Resources	This module has additional digital resources available – log on to the Student Portal, and follow the links to *Supplementary Digital Material* Some useful web links: • Biz/ed. 2012. [Online]. Available at: http://www.bized.co.uk/educators/16-19/tourism/marketing/activity/marketing1.htm [Accessed 17 May 2014].

Module Purpose

This module provides the student with foundational and practical knowledge of Project Management, the characteristics of the main project phases and the tools used in managing projects. It further provides knowledge of the four phases of Project Management; sourcing a viable project, planning resources and budgets, executing the project and closing the project by having the client sign off on it.

Module Outcomes

MO1	Analyse the lifecycle requirements of a project for implementation and execution.
MO2	Apply the Project Management framework in the design of a project.
MO3	Utilise the development life cycle as applied in Project Management for the inception and design of a project.

Module Pacer					
Code	**PRMN6210**	**Hour Sessions**	**48**	**Credits**	**11**
Learning Unit 1		**Theme: Introduction to Project Management Techniques**		*Notes on this LU*	
Sessions: 1–2 Related Outcomes: • MO1		Learning Objectives: • Definition of a project; • Define project management; • Define the roles of the project sponsor, project manager and the project steering committee; • Define project success.			
Learning Unit 2		**Theme: Project Lifecycle**		*Notes on this LU*	
Sessions: 3–4 Related Outcomes: • MO1		Learning Objectives: • Sub-divide a project into a number of phases; • Compare levels of effort at each stage of a project's life; • Explain how the level of influence and the cost of changes vary over the life of a project.			
Learning Unit 3		**Theme: Project Methodology**		*Notes on this LU*	
Sessions: 5–6 Related Outcomes: • MO1 • MO2		Learning Objectives: • Apply a systems approach to project management; • Explain how the project methodology can be sub-divided into ten phases; • Sub-divide each process into a number of sub-processes			
Learning Unit 4		**Theme: Project Stakeholder Management**		*Notes on this LU*	
Sessions: 7–8 Related Outcomes: • MO1		Learning Objectives: • Identify who are the project stakeholders; • Identify the stakeholder's needs and expectations.			
Learning Unit 5		**Theme: Project Feasibility Phase**		*Notes on this LU*	
Sessions: 9–11 Related Outcomes: • MO2 • MO3		Learning Objectives: • Develop a project charter; • Confirm that projects are feasible within identified constraints.			

Learning Unit 6	**Theme: Project Definition Phase**	*Notes on this LU*
Sessions: 12–13 Related Outcomes: • MO2 • MO3	Learning Objectives: • List and explain the sub-divisions of the project design phase; • Explain the project design phase in its entirety	
Learning Unit 7	**Theme: Project Execution Phase**	*Notes on this LU*
Sessions: 14–16 Related Outcomes: • MO2 • MO3	Learning Objectives: • List and explain the contents of the project execution phase; • Develop a project build-method; • Develop a project execution strategy	
Learning Unit 8	**Theme: Project Commissioning and Handover Phase**	*Notes on this LU*
Sessions: 17–18 Related Outcomes: • MO2 • MO3	Learning Objectives: • Explain the project commissioning process; • Explain the project handover process	
Learning Unit 9	**Theme: Project Plan**	*Notes on this LU*
Sessions: 19–20 Related Outcomes: • MO2 • MO3	Learning Objectives: • Illustrate the project plan as a flowchart; • Explain in detail the trade-off process to enable conflicting requirements to converge on an optimum arrangement.	
Learning Unit 10	**Theme: Project Scope Management**	*Notes on this LU*
Sessions: 21–22 Related Outcomes: • MO2 • MO3	Learning Objectives: • Compile a scope definition document; • Explain how to manage the scope change control process; • Demonstrate how to control scope creep; • Explain how to manage the scope verification and validation processes.	

Learning Unit 11	**Theme: Work Breakdown Structure (WBS)**	*Notes on this LU*
Sessions: 23–24 Related Outcomes: • MO2 • MO3	Learning Objectives: • Demonstrate an ability to use the Product Breakdown Structure (PBS) to sub-divide a project into a number of deliverables that align with the configuration requirements; • Use the Work Breakdown Structure (WBS) to sub-divide the work of projects to make the deliverables into a number of work packages; • Transfer the WBS structure on to a spread sheet format.	
Learning Unit 12	**Theme: Project Time Management**	*Notes on this LU*
Sessions: 25–26 Related Outcomes: • MO2 • MO3	Learning Objectives: • List and explain the characteristics of an activity; • Develop a list of activities from the WBS; • Estimate an activity's duration.	
Learning Unit 13	**Theme: Critical Path Method (CPM)**	*Notes on this LU*
Sessions: 27–29 Related Outcomes: • MO2 • MO3	Learning Objectives: • Draw a network diagram; • Calculate the activities' start and finish dates; • Identify the critical path.	
Learning Unit 14	**Theme: Gantt Charts**	*Notes on this LU*
Sessions: 30–32 Related Outcomes: • MO2 • MO3	Learning Objectives: • Draw a Gantt Chart; • Draw a Gantt Chart from a CPM tabular report; • Produce a hammock bar chart; • Produce a milestone chart; • Produce a rolling horizon Gantt Chart; • Produce a revised Gantt Chart.	

Learning Unit 15	**Theme: Project Procurement Management**	*Notes on this LU*
Sessions: 33–34 Related Outcomes: • MO2 • MO3	Learning Objectives: • Outline the procurement process; • Compile a procurement schedule; • Explain the trade-off between procurement and the other knowledge areas.	
Learning Unit 16	**Theme: Project Resource Management**	*Notes on this LU*
Sessions: 35–37 Related Outcomes: • MO2 • MO3	Learning Objectives: • Draw a resource histogram; • Smooth resource overloads.	
Learning Unit 17	**Theme: Project Cost Management**	*Notes on this LU*
Sessions: 38–40 Related Outcomes: • MO2 • MO3	Learning Objectives: • Explain the concept of the estimating continuum; • Apply the method of top-down estimating; • Explain the different types of costs; • Create a budget.	
Learning Unit 18	**Theme: Project Control**	*Notes on this LU*
Sessions: 41–44 Related Outcomes: • MO2 • MO3	Learning Objectives: • Apply the project control cycle to a variety of scenarios; • Explain how to monitor the progress of a project.	
Learning Unit 19	**Theme: Project Quality Management**	*Notes on this LU*
Sessions: 45–48 Related Outcomes: • MO2 • MO3	Learning Objectives: • Define a range of quality terms; • Explain how to set up a project quality plan; • Explain how to set up a project quality assurance plan; • Explain how to set up a project quality control plan; • Explain how to set up a continuous improvement process.	

Assessments

Integrated Curriculum Engagement (ICE)	
Minimum number of ICE activities to complete:	4
Weighting towards the final module mark:	10%
Complete the first ICE task by the end of:	LU3
Complete the second ICE task by the end of:	LU7
Complete the third ICE task by the end of:	LU11
All ICE tasks to be completed by the end of:	LU15

Assignments/ Projects	Assignment
Weighting	25%
Duration	10 hours
Submit after	LU17
Learning Units covered	LU1–14
Resources required	Web access

Tests/ Examination	Test	Examination
Weighting	30%	35%
Duration	1 hour	2 hours
Total marks	60	120
Open/ closed book	Closed book	Closed book
Resources required	None	None
Learning Units covered	LU1–9	All

Assessment Preparation Guidelines		
	Format of the Assessment ***(The Focus/ Approach/ Objectives)***	**Preparation Hints** ***(How to Prepare, Resources to Use, etc.)***
Assignment	This assignment will challenge you to do some independent reading and research on the material covered in LU1–14, as you cannot rely only on information in the prescribed textbook to complete the task.	You need to refer to several examples of large infrastructure projects around the world, either completed or in progress, so make sure that you start looking out for interesting newspaper articles or websites well in advance.

Assessment Preparation Guidelines		
	Format of the Assessment ***(The Focus/ Approach/ Objectives)***	**Preparation Hints** ***(How to Prepare, Resources to Use, etc.)***
Test	The test covers material from LU1–9. Questions are theory-based and require the application of the theory to scenarios. The questions consist of a variety of formats, such as match-the-column questions, short questions, and paragraph questions. There are several paragraph questions included, as writing skills are important in this module.	Include the following in your preparation: • Work through all the review questions for LU1–9; • Ensure that you can answer questions relating to all of the Learning Objectives for LU1–9; • Work through mock assessments or previous assessments.
Examination	The examination covers material from all the LUs (LU1–19). Questions are theory-based and require the application of the theory to scenarios. The questions consist of a variety of formats, such as match-the-column questions, short questions, and paragraph questions. There are several paragraph questions included, as writing skills are important in this module.	Include the following in your preparation: • Work through all the review questions for LU1–19; • Ensure that you can answer questions relating to all of the Learning Objectives for LU1–19; • Work through mock assessments or previous assessments.

Glossary of Key Terms for this Module

Term	Definition	*My notes*
Acceptance Criteria	Those criteria, including performance requirements and essential conditions that must be met before project deliverables are accepted.	
Activity	A component of work performed during the course of a project. See also schedule activity. Activity Attributes [Output/ Input]. Multiple attributes associated with each schedule activity that can be included within the activity list. Activity attributes include activity codes, predecessor activities, successor activities, logical relationships, leads and lags, resource requirements, imposed dates, constraints and assumptions.	
Activity Definition [Process]	The process of identifying the specific schedule activities that need to be performed to produce the various project deliverables.	
Activity Description (AD)	A short phrase or label for each schedule activity used in conjunction with an activity identifier to differentiate that project schedule activity from other schedule activities. The activity description normally describes the scope of work of the schedule activity.	
Activity Duration	The time in calendar units between the start and finish of a schedule activity. See also actual duration, original duration, and remaining duration.	
Activity Duration Estimating [Process]	The process of estimating the number of work periods that will be needed to complete individual schedule activities.	
Activity Identifier	A short unique numeric or text identification assigned to each schedule activity to differentiate that project activity from other activities. Typically unique within any one project schedule network diagram.	

Term	Definition	*My notes*
Activity List [Output/ Input]	A documented tabulation of schedule activities that shows the activity description, activity identifier, and a sufficiently detailed scope of work description so project team members understand what work is to be performed.	
Activity-on-Arrow (AOA)	See arrow diagramming method.	
Activity-on-Node (AON)	See precedence diagramming method.	
Actual Cost (AC)	Total costs actually incurred and recorded in accomplishing work performed during a given time period for a schedule activity or work breakdown structure component. Actual cost can sometimes be direct labour hours alone, direct costs alone, or all costs including indirect costs. Also referred to as the actual cost of work performed (ACWP). See also earned value management and earned value technique.	
Actual Cost of Work Performed (ACWP)	See actual cost (AC).	
Actual Duration	The time in calendar units between the actual start date of the schedule activity and either the data date of the project schedule (if the schedule activity is in progress) or the actual finish date (if the schedule activity is complete).	
Actual Finish Date (AF)	The point in time that work actually ended on a schedule activity. (Note: In some application areas, the schedule activity is considered “finished” when work is “substantially complete.”)	
Actual Start Date (AS)	The point in time that work actually started on a schedule activity.	
Approved Change Request [Output/ Input]	A change request that has been processed through the integrated change control process and approved. Contrast with requested change.	

Term	Definition	*My notes*
Arrow Diagramming Method (ADM) [Technique]	A schedule network diagramming technique in which schedule activities are represented by arrows. The tail of the arrow represents the start, and the head represents the finish of the schedule activity. (The length of the arrow does not represent the expected duration of the schedule activity.) Schedule activities are connected at points called nodes (usually drawn as small circles) to illustrate the sequence in which the schedule activities are expected to be performed. See also precedence diagramming method.	
Assumptions [Output/ Input]	Assumptions are factors that, for planning purposes, are considered to be true, real, or certain without proof or demonstration. Assumptions affect all aspects of project planning, and are part of the progressive elaboration of the project. Project teams frequently identify, document, and validate assumptions as part of their planning process. Assumptions generally involve a degree of risk.	
Backward Pass	The calculation of late finish dates and late start dates for the uncompleted portions of all scheduled activities. Determined by working backwards through the schedule network logic from the project's end date. The end date may be calculated in a forward pass or set by the customer or sponsor. See also schedule network analysis.	
Bar Chart [Tool]	A graphic display of schedule-related information. In a typical bar chart, schedule activities or work breakdown structure components are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars. Also called a Gantt chart.	

Term	Definition	*My notes*
Baseline	The approved time phased plan (for a project, a work breakdown structure component, a work package, or a schedule activity), plus or minus approved project scope, cost, schedule, and technical changes. Generally refers to the current baseline, but may refer to the original or some other baseline. Usually used with a modifier (e.g., cost baseline, schedule baseline, performance measurement baseline, technical baseline). See also performance measurement baseline.	
Baseline Finish Date	The finish date of a schedule activity in the approved schedule baseline. See also scheduled finish date.	
Baseline Start Date	The start date of a schedule activity in the approved schedule baseline. See also scheduled start date.	
Bill of Materials (BOM)	A documented formal hierarchical tabulation of the physical assemblies, subassemblies, and components needed to fabricate a product.	
Bottom-up Estimating	A method of estimating a component of work. The work is decomposed into more detail. An estimate is prepared of what is needed to meet the requirements of each of the lower, more detailed pieces of work, and these estimates are then aggregated into a total quantity for the component of work. The accuracy of bottom-up estimating is driven by the size and complexity of the work identified at the lower levels. Generally smaller work scopes increase the accuracy of the estimates.	

Term	Definition	*My notes*
Bottom-up Estimating	A method of estimating a component of work. The work is decomposed into more detail. An estimate is prepared of what is needed to meet the requirements of each of the lower, more detailed pieces of work, and these estimates are then aggregated into a total quantity for the component of work. The accuracy of bottom-up estimating is driven by the size and complexity of the work identified at the lower levels. Generally smaller work scopes increase the accuracy of the estimates.	
Brainstorming	A general data gathering and creativity technique that can be used to identify risks, ideas, or solutions to issues by using a group of team members or subject-matter experts. Typically, a brainstorming session is structured so that each participant's ideas are recorded for later analysis.	
Budget	The approved estimate for the project or any work breakdown structure component or any schedule activity. See also estimate.	
Budget at Completion (BAC)	The sum of all the budget values established for the work to be performed on a project or a work breakdown structure component or a schedule activity. The total planned value for the project.	
Budgeted Cost of Work Performed (BCWP)	See earned value (EV).	
Budgeted Cost of Work Scheduled (BCWS)	See planned value (PV).	
Buyer	The acquirer of products, services or results for an organisation.	
Calendar Unit	The smallest unit of time used in scheduling the project. Calendar units are generally in hours, days, or weeks, but can also be in quarter years, months, shifts, or even in minutes.	

Term	Definition	*My notes*
Change Control	Identifying, documenting, approving or rejecting, and controlling changes to the project baselines.	
Change Control Board (CCB)	A formally constituted group of stakeholders responsible for reviewing, evaluating, approving, delaying, or rejecting changes to the project, with all decisions and recommendations being recorded.	
Change Control System [Tool]	A collection of formal documented procedures that define how project deliverables and documentation will be controlled, changed, and approved. In most application areas the change control system is a subset of the configuration management system.	
Change Request	Requests to expand or reduce the project scope, modify policies, processes, plans, or procedures, modify costs or budgets, or revise schedules. Requests for a change can be direct or indirect, externally or internally initiated, and legally or contractually mandated or optional. Only formally documented requested changes are processed and only approved change requests are implemented.	
Charter	See project charter.	
Checklist [Output/ Input]	Items listed together for convenience of comparison, or to ensure the actions associated with them are managed appropriately and not forgotten. An example is a list of items to be inspected that is created during quality planning and applied during quality control.	
Claim	A request, demand, or assertion of rights by a seller against a buyer, or vice versa, for consideration, compensation, or payment under the terms of a legally binding contract, such as for a disputed change.	

Term	Definition	*My notes*
Close Project [Process]	The process of finalising all activities across all of the project process groups to formally close the project or phase.	
Closing Processes [Process Group]	Those processes performed to formally terminate all activities of a project or phase, and transfer the completed product to others or close a cancelled project.	
Communication	A process through which information is exchanged among persons using a common system of symbols, signs, or behaviours.	
Communication Management Plan [Output/ Input]	The document that describes: the communications needs and expectations for the project; how and in what format information will be communicated; when and where each communication will be made; and who is responsible for providing each type of communication. A communication management plan can be formal or informal, highly detailed or broadly framed, based on the requirements of the project stakeholders. The communication management plan is contained in, or is a subsidiary plan of, the project management plan.	
Communications Planning [Process]	The process of determining the information and communication needs of the project stakeholders: who they are; what is their level of interest and influence on the project; who needs what information; when will they need it; and how it will be given to them.	
Compensation	Something given or received, a payment or recompense, usually something monetary or in kind for products, services, or results provided or received.	

Term	Definition	*My notes*
Configuration Management System [Tool]	A subsystem of the overall project management system. It is a collection of documented formal procedures used to apply technical and administrative direction and surveillance to: identify and document the functional and physical characteristics of a product, result, service, or component; control any changes to such characteristics; record and report each change and its implementation status; and support the audit of the products, results, or components to verify conformance to requirements. It includes the documentation, tracking systems, and defined approval levels necessary for authorising and controlling changes. In most application areas, the configuration management system includes the change control system.	
Constraint [Input]	The state, quality, or sense of being restricted to a given course of action or inaction. An applicable restriction or limitation, either internal or external to the project, which will affect the performance of the project or a process. For example, a schedule constraint is any limitation or restraint placed on the project schedule that affects when a schedule activity can be scheduled and is usually in the form of fixed imposed dates. A cost constraint is any limitation or restraint placed on the project budget, such as funds available over time. A project resource constraint is any limitation or restraint placed on resource usage, such as what resource skills or disciplines are available and the amount of a given resource available during a specified time frame.	
Contingency	See reserve.	
Contingency Allowance	See reserve.	

Term	Definition	*My notes*
Contingency Reserve [Output/ Input]	The amount of funds, budget, or time needed above the estimate to reduce the risk of overruns of project objectives to a level acceptable to the organisation.	
Contract [Output/ Input]	A contract is a mutually binding agreement that obligates the seller to provide the specified product or service or result and obligates the buyer to pay for it.	
Contract Administration [Process]	The process of managing the contract and the relationship between the buyer and seller; reviewing and documenting how a seller is performing or has performed to establish required corrective actions and provide a basis for future relationships with the seller; managing contract related changes; and, when appropriate, managing the contractual relationship with the outside buyer of the project.	
Contract Closure [Process]	The process of completing and settling the contract, including resolution of any open items and closing each contract.	
Contract Management Plan [Output/ Input]	The document that describes how a specific contract will be administered and can include items such as required documentation delivery and performance requirements. A contract management plan can be formal or informal, highly detailed or broadly framed, based on the requirements in the contract. Each contract management plan is a subsidiary plan of the project management plan.	
Contract Statement of Work (SOW) [Output/ Input]	A narrative description of products, services, or results to be supplied under contract.	
Control [Technique]	Comparing actual performance with planned performance, analysing variances, assessing trends to effect process improvements, evaluating possible alternatives, and recommending appropriate corrective action as needed.	

Term	Definition	*My notes*
Control Account Plan (CAP) [Tool]	A plan for all the work and effort to be performed in a control account. Each CAP has a definitive statement of work, schedule, and time-phased budget. Previously called a Cost Account Plan.	
Control Chart [Tool]	A graphic display of process data over time and against established control limits that has a centreline that assists in detecting a trend of plotted values toward either control limit.	
Control Limits	The area composed of three standard deviations on either side of the centreline, or mean, of a normal distribution of data plotted on a control chart that reflects the expected variation in the data. See also specification limits.	
Controlling	See control.	
Corrective Action	Documented direction for executing the project work to bring expected future performance of the project work in line with the project management plan.	
Cost	The monetary value or price of a project activity* or component that includes the monetary worth of the resources required to perform and complete the activity or component, or to produce the component. A specific cost can be composed of a combination of cost components including direct labour hours, other direct costs, indirect labour hours, other indirect costs, and purchased price. (However, in the earned value management methodology, in some instances, the term cost can represent only labour hours without conversion to monetary worth.) See also actual cost and estimate.	
Cost Baseline	See baseline.	
Cost Budgeting [Process]	The process of aggregating the estimated costs of individual activities or work packages to establish a cost baseline.	
Cost Control [Process]	The process of influencing the factors that create variances, and controlling changes to the project budget.	

Term	Definition	*My notes*
Cost Estimating [Process]	The process of developing an approximation of the cost of the resources needed to complete project activities*.	
Cost Management Plan [Output/ Input]	The document that sets out the format and establishes the activities and criteria for planning, structuring, and controlling the project costs. A cost management plan can be formal or informal, highly detailed or broadly framed, based on the requirements of the project stakeholders. The cost management plan is contained in, or is a subsidiary plan, of the project management plan.	
Cost of Quality (COQ) [Technique]	Determining the costs incurred to ensure quality. Prevention and appraisal costs (cost of conformance) include costs for quality planning, quality control (QC) and quality assurance to ensure compliance to requirements (i.e. training, QC systems, etc.). Failure costs (cost of non-conformance) include costs to rework products, components, or processes that are non-compliant, costs of warranty work and waste, and loss of reputation.	
Cost Performance Index (CPI	A measure of cost efficiency on a project. It is the ratio of earned value (EV) to actual costs (AC). CPI = EV divided by AC. A value equal to or greater than one indicates a favourable condition and a value less than one indicates an unfavourable condition.	
Cost Variance (CV)	A measure of cost performance on a project. It is the algebraic difference between earned value (EV) and actual cost (AC). CV = EV minus AC. A positive value indicates a favourable condition and a negative value indicates an unfavourable condition.	

Term	Definition	*My notes*
Crashing [Technique	A specific type of project schedule compression technique performed by taking action to decrease the total project schedule duration* after analysing a number of alternatives to determine how to get the maximum schedule duration compression for the least additional cost. Typical approaches for crashing a schedule include reducing schedule activity durations and increasing the assignment of resources on schedule activities. See schedule compression and see also fast tracking.	
Create WBS (Work Breakdown Structure) [Process]	The process of subdividing the major project deliverables and project work into smaller, more manageable components.	
Critical Activity	Any schedule activity on a critical path in a project schedule. Most commonly determined by using the critical path method. Although some activities are “critical,” in the dictionary sense, without being on the critical path, this meaning is seldom used in the project context.	
Critical Path [Output/ Input]	Generally, but not always, the sequence of schedule activities that determines the duration of the project. Generally, it is the longest path through the project. However, a critical path can end, as an example, on a schedule milestone that is in the middle of the project schedule and that has a finish-no-later-than imposed date schedule constraint. See also critical path method.	

Term	Definition	*My notes*
Critical Path Method (CPM) [Technique]	A schedule network analysis technique* used to determine the amount of scheduling flexibility (the amount of float) on various logical network paths in the project schedule network, and the minimum total project duration. Early start and finish dates* are calculated by means of a forward pass, using a specified start date. Late start and finish dates* are calculated by means of a backward pass, starting from a specified completion date, which sometimes is the project early finish date determined during the forward pass calculation.	
Current Finish Date	The current estimate of the point in time when a schedule activity will be completed, where the estimate reflects any reported work progress. See also scheduled finish date and baseline finish date.	
Current Start Date	The current estimate of the point in time when a schedule activity will begin, where the estimate reflects any reported work progress. See also scheduled start date and baseline start date.	
Customer	The person or organisation that will use the project's product or service or result.	
Date	A term representing the day, month, and year of a calendar, and, in some instances, the time of day.	
Deliverable [Output/ Input]	Any unique and verifiable product, result, or capability to perform a service that must be produced to complete a process, phase, or project. Often used more narrowly in reference to an external deliverable, which is a deliverable that is subject to approval by the project sponsor or customer. See also product, service, and result.	

Term	Definition	*My notes*
Delphi Technique [Technique].	An information gathering technique used as a way to reach a consensus of experts on a subject. Experts on the subject participate in this technique anonymously. A facilitator uses a questionnaire to solicit ideas about the important project points related to the subject. The responses are summarised and are then recirculated to the experts for further comment. Consensus may be reached in a few rounds of this process. The Delphi technique helps reduce bias in the data and keeps any one person from having undue influence on the outcome.	
Dependency	See logical relationship.	
Design Review [Technique]	A management technique used for evaluating a proposed design to ensure that the design of the system or product meets the customer requirements, or to assure that the design will perform successfully, can be produced and can be maintained.	
Discipline	A field of work requiring specific knowledge and that has a set of rules governing work conduct, e.g. mechanical engineering, computer programming, cost estimating, etc.	
Document	A medium and the information recorded thereon, that generally has permanence and can be read by a person or a machine. Examples include project management plans, specifications, procedures, studies, and manuals.	
Documented Procedure	A formalised written description of how to carry out an activity, process, technique, or methodology.	

Term	Definition	*My notes*
Dummy Activity	A schedule activity of zero duration used to show a logical relationship in the arrow diagramming method. Dummy activities are used when logical relationships cannot be completely or correctly described with schedule activity arrows. Dummy activities are generally shown graphically as a dashed line headed by an arrow.	
Duration (DU or DUR)	The total number of work periods (not including holidays or other nonworking periods) required to complete a schedule activity or work breakdown structure component. Usually expressed as workdays or workweeks. Sometimes incorrectly equated with elapsed time. Contrast with effort. See also original duration, remaining duration, and actual duration.	
Early Finish Date (EF)	In the critical path method, the earliest possible point in time on which the uncompleted portions of a schedule activity (or the project) can finish, based on the schedule network logic, the data date, and any schedule constraints. Early finish dates can change as the project progresses and as changes are made to the project management plan.	
Early Start Date (ES)	In the critical path method, the earliest possible point in time on which the uncompleted portions of a schedule activity (or the project) can start, based on the schedule network logic, the data date and any schedule constraints. Early start dates can change as the project progresses and as changes are made to the project management plan.	

Term	Definition	*My notes*
Earned Value (EV)	The value of completed work expressed in terms of the approved budget assigned to that work for a schedule activity or work breakdown structure component. Also referred to as the budgeted cost of work performed (BCWP).	
Earned Value Management (EVM)	A management methodology for integrating scope, schedule, and resources, and for objectively measuring project performance and progress. Performance is measured by determining the budgeted cost of work performed (i.e. earned value) and comparing it to the actual cost of work performed (i.e. actual cost). Progress is measured by comparing the earned value to the planned value.	
Earned Value Technique (EVT) [Technique]	A specific technique for measuring the performance of work for a work breakdown structure component, control account, or project. Also referred to as the earning rules and crediting method.	
Effort	The number of labour units required to complete a schedule activity or work breakdown structure component. Usually expressed as staff hours, staff days, or staff weeks. Contrast with duration.	
Enterprise	A company, business, firm, partnership, corporation, or governmental agency.	
Enterprise Environmental Factors [Output/ Input]	Any or all external environmental factors and internal organisational environmental factors that surround or influence the project's success. These factors are from any or all of the enterprises involved in the project, and include organisational culture and structure, infrastructure, existing resources, commercial databases, market conditions and project management software.	

Term	Definition	*My notes*
Estimate [Output/ Input]	A quantitative assessment of the likely amount or outcome. Usually applied to project costs, resources, effort, and durations and is usually preceded by a modifier (i.e. preliminary, conceptual, feasibility and order-of-magnitude, definitive). It should always include some indication of accuracy (e.g. ±x percent).	
Estimate at Completion (EAC) [Output/ Input]	The expected total cost of a schedule activity, a work breakdown structure component, or the project when the defined scope of work will be completed. EAC is equal to the actual cost (AC) plus the estimate to complete (ETC) for all of the remaining work. EAC = AC plus ETC. The EAC may be calculated based on performance to date or estimated by the project team based on other factors, in which case it is often referred to as the latest revised estimate. See also earned value technique and estimate to complete.	
Estimate to Complete (ETC) [Output/ Input]	The expected cost needed to complete all the remaining work for a schedule activity, work breakdown structure component, or the project. See also earned value technique and estimate at completion.	
Event	Something that happens, an occurrence, an outcome.	
Exception Report	Document that includes only major variations from the plan (rather than all variations).	
Execute	Directing, managing, performing and accomplishing the project work; providing the deliverables and providing work performance information.	

Term	Definition	*My notes*
Expert Judgment [Technique]	Judgment provided based on expertise in an application area, knowledge area, discipline, industry, etc. as appropriate for the activity being performed. Such expertise may be provided by any group or person with specialised education, knowledge, skill, experience, or training, and is available from many sources, which include: other units within the performing organisation; consultants; stakeholders, including customers; professional and technical associations; and industry groups.	
Failure Mode and Effect Analysis (FMEA) [Technique]	An analytical procedure in which each potential failure mode in every component of a product is analysed to determine its effect on the reliability of that component and, by itself or in combination with other possible failure modes, its effect on the reliability of the product or system and on the required function of the component; or the examination of a product (at the system and/ or lower levels) for all ways that a failure may occur. For each potential failure, an estimate is made of its effect on the total system and of its impact. In addition, a review is undertaken of the action planned to minimise the probability of failure and to minimise its effects.	
Fast Tracking [Technique]	A specific project schedule compression technique that changes network logic to overlap phases that would normally be done in sequence, such as the design phase and construction phase, or to perform schedule activities in parallel. See schedule compression and see also crashing.	
Finish Date	A point in time associated with a schedule activity's completion. Usually qualified by one of the following: actual, planned, estimated, scheduled, early, late, baseline, target or current.	

Term	Definition	*My notes*
Finish-to-Finish (FF)	The logical relationship where completion of work of the successor activity cannot finish until the completion of work of the predecessor activity. See also logical relationship.	
Finish-to-Start (FS)	The logical relationship where initiation of work of the successor activity depends upon the completion of work of the predecessor activity. See also logical relationship.	
Firm-Fixed-Price (FFP) Contract	A type of fixed price contract where the buyer pays the seller a set amount (as defined by the contract), regardless of the seller's costs.	
Fixed-Price-Incentive-Fee (FPIF) Contract	A type of contract where the buyer pays the seller a set amount (as defined by the contract), and the seller can earn an additional amount if the seller meets defined performance criteria.	
Fixed-Price or Lump-Sum Contract	A type of contract involving a fixed total price for a well-defined product. Fixed-price contracts may also include incentives for meeting or exceeding selected project objectives, such as schedule targets. The simplest form of a fixed price contract is a purchase order.	
Float	Also called slack. See total float and see also free float.	
Flowcharting [Technique]	The depiction in a diagram format of the inputs, process actions, and outputs of one or more processes within a system.	
Forecasts	Estimates or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecast. Forecasts are updated and reissued based on work performance information provided as the project is executed. The information is based on the project's past performance and expected future performance, and includes information that could impact the project in the future, such as estimate at completion and estimate to complete.	

Term	Definition	*My notes*
Forward Pass	The calculation of the early start and early finish dates for the uncompleted portions of all network activities. See also schedule network analysis and backward pass.	
Free Float (FF)	The amount of time that a schedule activity can be delayed without delaying the early start of any immediately following schedule activities. See also total float.	
Functional Manager	Someone with management authority over an organisational unit within a functional organisation. The manager of any group that actually makes a product or performs a service. Sometimes called a line manager.	
Functional Organisation	A hierarchical organisation where each employee has one clear superior, staff are grouped by areas of specialisation, and managed by a person with expertise in that area.	
Funds	A supply of money or pecuniary resources immediately available.	
Gantt Chart	See bar chart.	
Goods	Commodities, wares, merchandise.	
Hammock Activity	See summary activity.	
Historical Information	Documents and data on prior projects including project files, records, correspondence, closed contracts, and closed projects.	
Human Resource Planning [Process]	The process of identifying and documenting project roles, responsibilities and reporting relationships, as well as creating the staffing management plan.	
Input [Process Input]	Any item, whether internal or external to the project that is required by a process before that process proceeds. May be an output from a predecessor process.	
Inspection [Technique]	Examining or measuring to verify whether an activity, component product, result or service conforms to specified requirements.	

Term	Definition	*My notes*
Integrated Change Control [Process]	The process of reviewing all change requests, approving changes and controlling changes to deliverables and organisational process assets.	
Invitation for Bid (IFB)	Generally, this term is equivalent to request for proposal. However, in some application areas, it may have a narrower or more specific meaning.	
Knowledge	Knowing something with the familiarity gained through experience, education, observation, or investigation, it is understanding a process, practice, or technique, or how to use a tool.	
Lag [Technique]	A modification of a logical relationship that directs a delay in the successor activity. For example, in a finish-to-start dependency with a ten-day lag, the successor activity cannot start until ten days after the predecessor activity has finished. See also lead.	
Late Finish Date (LF)	In the critical path method, the latest possible point in time that a schedule activity may be completed based upon the schedule network logic, the project completion date and any constraints assigned to the schedule activities without violating a schedule constraint or delaying the project completion date. The late finish dates are determined during the backward pass calculation of the project schedule network	
Late Start Date (LS)	In the critical path method, the latest possible point in time that a schedule activity may begin based upon the schedule network logic, the project completion date and any constraints assigned to the schedule activities without violating a schedule constraint or delaying the project completion date. The late start dates are determined during the backward pass calculation of the project schedule network.	

Term	Definition	*My notes*
Latest Revised Estimate	See estimate at completion.	
Lessons Learned [Output/ Input]	The learning gained from the process of performing the project. Lessons learned may be identified at any point. Also considered a project record, to be included in the lessons learned knowledge base.	
Life Cycle	See project life cycle.	
Log	A document used to record and describe or denote selected items identified during execution of a process or activity. Usually used with a modifier, such as issue, quality control, action or defect.	
Logic Diagram	See project schedule network diagram.	
Logical Relationship	A dependency between two project schedule activities, or between a project schedule activity and a schedule milestone. See also precedence relationship. The four possible types of logical relationships are: Finish-to-Start; Finish-to-Finish; Start-to- Start; and Start-to-Finish.	
Master Schedule [Tool]	A summary-level project schedule that identifies the major deliverables and work breakdown structure components and key schedule milestones. See also milestone schedule.	
Matrix Organisation	Any organisational structure in which the project manager shares responsibility with the functional managers for assigning priorities and for directing the work of persons assigned to the project.	
Methodology	A system of practices, techniques, procedures, and rules used by those who work in a discipline.	
Milestone	A significant point or event in the project. See also schedule milestone.	
Milestone Schedule [Tool]	A summary-level schedule that identifies the major schedule milestones. See also master schedule.	

Term	Definition	*My notes*
Monitor	Collect project performance data with respect to a plan; produce performance measures; and report and disseminate performance information.	
Network	See project schedule network diagram.	
Network Analysis	See schedule network analysis.	
Network Logic	The collection of schedule activity dependencies that makes up a project schedule network diagram.	
Network Path	Any continuous series of schedule activities connected with logical relationships in a project schedule network diagram.	
Networking [Technique]	Developing relationships with persons who may be able to assist in the achievement of objectives and responsibilities.	
Node	One of the defining points of a schedule network; a junction point joined to some or all of the other dependency lines. See also arrow diagramming method and precedence diagramming method.	
Objective	Something towards which work is to be directed; a strategic position to be attained; or a purpose to be achieved; a result to be obtained; a product to be produced; or a service to be performed.	
Operations	An organisational function performing the ongoing execution of activities that produce the same product or provide a repetitive service. Examples are: production operations, manufacturing operations, and accounting operations.	
Opportunity	A condition or situation favourable to the project, a positive set of circumstances, a positive set of events, a risk that will have a positive impact on project objectives, or a possibility for positive changes. Contrast with threat.	
Organisation	A group of persons organised for some purpose or to perform some type of work within an enterprise.	

Term	Definition	*My notes*
Organisation Chart [Tool]	A method for depicting interrelationships among a group of persons working together toward a common objective.	
Organisational Breakdown Structure (OBS) [Tool]	A hierarchically organised depiction of the project organisation arranged so as to relate the work packages to the performing organisational units. (Sometimes OBS is written as Organisation Breakdown Structure with the same definition.)	
Organisational Process Assets [Output/ Input]	Any or all process related assets, from any or all of the organisations involved in the project that are or can be used to influence the project's success. These process assets include formal and informal plans, policies, procedures, and guidelines. The process assets also include the organisations' knowledge bases such as lessons learned and historical information.	
Original Duration (OD)	The activity duration originally assigned to a schedule activity and not updated as progress is reported on the activity. Typically used for comparison with actual duration and remaining duration when reporting schedule progress.	
Output [Process Output]	A product, result, or service generated by a process. May be an input to a successor process.	
Parametric Estimating [Technique]	An estimating technique that uses a statistical relationship between historical data and other variables (e.g. square footage in construction, lines of code in software development) to calculate an estimate for activity parameters, such as scope, cost, budget, and duration. This technique can produce higher levels of accuracy depending upon the sophistication and the underlying data built into the model. An example for the cost parameter is multiplying the planned quantity of work to be performed by the historical cost per unit to obtain the estimated cost.	

Term	Definition	*My notes*
Pareto Chart [Tool]	A histogram, ordered by frequency of occurrence, that shows how many results were generated by each identified cause.	
Performance Measurement Baseline	An approved plan for the project work against which project execution is compared and deviations are measured for management control. The performance measurement baseline typically integrates scope, schedule, and cost parameters of a project, but may also include technical and quality parameters.	
Performance Reporting [Process]	The process of collecting and distributing performance information. This includes status reporting, progress measurement and forecasting.	
Performance Reports [Output/ Input]	Documents and presentations that provide organised and summarised work performance information, earned value management parameters and calculations, and analyses of project work progress and status. Common formats for performance reports include bar charts, S-curves, histograms, tables, and project schedule network diagrams showing current schedule status.	
Planned Finish Date (PF)	See scheduled finish date.	
Planned Start Date (PS)	See scheduled start date.	
Planned Value (PV)	The authorised budget assigned to the scheduled work to be accomplished for a schedule activity or work breakdown structure component. Also referred to as the budgeted cost of work scheduled (BCWS).	
Planning Package	A WBS component below the control account with known work content but without detailed schedule activities. See also control account.	

Term	Definition	*My notes*
Planning Processes [Process Group]	Those processes performed to define and mature the project scope, develop the project management plan, and identify and schedule the project activities* that occur within the project.	
Portfolio	A collection of projects or programs and other work that is grouped together to facilitate effective management of that work to meet strategic business objectives. The projects or programs of the portfolio may not necessarily be interdependent or directly related.	
Portfolio Management [Technique]	The centralised management of one or more portfolios, which includes identifying, prioritising, authorising, managing and controlling projects, programs, and other related work, to achieve specific strategic business objectives.	
Precedence Diagramming Method (PDM) [Technique]	A schedule network diagramming technique in which schedule activities are represented by boxes (or nodes). Schedule activities are graphically linked by one or more logical relationships to show the sequence in which the activities are to be performed.	
Precedence Relationship	The term used in the precedence diagramming method for a logical relationship. In current usage, however, precedence relationship, logical relationship and dependency are widely used interchangeably, regardless of the diagramming method used.	
Predecessor Activity	The schedule activity that determines when the logical successor activity can begin or end.	
Preventive Action	Documented direction to perform an activity that can reduce the probability of negative consequences associated with project risks*.	
Probability and Impact Matrix [Tool]	A common way to determine whether a risk is considered low, moderate, or high by combining the two dimensions of a risk: its probability of occurrence, and its impact on objectives if it occurs.	

Term	Definition	*My notes*
Procurement Documents [Output/ Input]	Those documents utilised in bid and proposal activities that include buyer's Invitation for Bid, Invitation for Negotiations, Request for Information, Request for Quotation, Request for Proposal and seller's responses.	
Procurement Management Plan [Output/ Input]	The document that describes how procurement processes, from developing procurement documentation through contract closure, will be managed.	
Product Life Cycle	A collection of generally sequential, non-overlapping product phases* whose name and number are determined by the manufacturing and control needs of the organisation. The last product life cycle phase for a product is generally the product's product life cycles.	
Product Scope	The features and functions that characterise a product, service or result.	
Product Scope Description	The documented narrative description of the product scope.	
Program Management Office (PMO)	The centralised management of a particular program or programs, such that corporate benefit is realised by the sharing of resources, methodologies, tools, and techniques, and related high-level project management focus. See also project management office.	
Project	A temporary endeavour undertaken to create a unique product, service, or result.	
Project Calendar	A calendar of working days or shifts that establishes those dates on which schedule activities are worked and nonworking days that determine those dates on which schedule activities are idle. Typically defines holidays, weekends and shift hours. See also resource calendar.	

Term	Definition	*My notes*
Project Charter [Output/ Input]	A document issued by the project initiator or sponsor that formally authorises the existence of a project, and provides the project manager with the authority to apply organisational resources to project activities.	
Project Initiation	Launching a process that can result in the authorisation and scope definition of a new project.	
Project Life Cycle	A collection of generally sequential project phases whose name and number is determined by the control needs of the organisation or organisations involved in the project. A life cycle can be documented with a methodology.	
Project Management (PM)	The application of knowledge, skills, tools, and techniques to project activities* to meet the project requirements.	
Project Management Body of Knowledge (PMBOK®)	An inclusive term that describes the sum of knowledge within the profession of project management. As with other professions such as law, medicine, and accounting, the body of knowledge rests with the practitioners and academics that apply and advance it. The complete project management body of knowledge includes proven traditional practices that are widely applied and innovative practices that are emerging in the profession. The body of knowledge includes both published and unpublished material. The PMBOK is constantly evolving.	
Project Management Information System (PMIS) [Tool]	An information system consisting of the tools and techniques used to gather, integrate, and disseminate the outputs of project management processes. It is used to support all aspects of the project, from initiating through closing, and can include both manual and automated systems.	

Term	Definition	*My notes*
Project Management Knowledge Area	An identified area of project management defined by its knowledge requirements and described in terms of its component processes, practices, inputs, outputs, tools, and techniques.	
Project Management Office (PMO)	An organisational body or entity assigned various responsibilities related to the centralised and coordinated management of those projects under its domain. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of a project. See also program management office.	
Project Management Plan [Output/Input]	A formal approved document that defines how the projected is executed, monitored and controlled. It may be summary or detailed and may be composed of one or more subsidiary management plans and other planning documents.	
Project Management Process	One of the 44 processes, unique to project management and described in the PMBOK® Guide.	
Project Management Process Group	A logical grouping of the project management processes described in the PMBOK® Guide. The project management process groups include initiating processes, planning processes, executing processes, monitoring and controlling processes and closing processes. Collectively, these five groups are required for any project, have clear internal dependencies, and must be performed in the same sequence on each project, independent of the application area or the specifics of the applied project life cycle. Project management process groups are not project phases.	
Project Management Professional (PMP®)	A person certified as a PMP® by the Project Management Institute (PMI®).	

Term	Definition	*My notes*
Project Management Software [Tool]	A class of computer software applications specifically designed to aid the project management team with planning, monitoring, and controlling the project, including: cost estimating, scheduling, communications, collaboration, configuration management, document control, records management and risk analysis.	
Project Management System [Tool]	The aggregation of the processes, tools, techniques, methodologies, resources and procedures to manage a project. The system is documented in the project management plan and its content will vary depending upon the application area, organisational influence, complexity of the project, and the availability of existing systems. A project management system, which can be formal or informal, aids a project manager in effectively guiding a project to completion. A project management system is a set of processes and the related monitoring and control functions that are consolidated and combined into a functioning, unified whole.	
Project Management Team	The members of the project team who are directly involved in project management activities. On some smaller projects, the project management team may include virtually all of the project team members.	
Project Manager (PM)	The person assigned by the performing organisation to achieve the project objectives*.	
Project Organisation Chart [Output/ Input]	A document that graphically depicts the project team members and their interrelationships for a specific project.	

Term	Definition	*My notes*
Project Phase	A collection of logically related project activities*, usually culminating in the completion of a major deliverable. Project phases (also called phases) are mainly completed sequentially, but can overlap in some project situations. Phases can be subdivided into sub-phases and then components; this hierarchy, if the project or portions of the project are divided into phases, is contained in the work breakdown structure. A project phase is a component of a project life cycle. A project phase is not a project management process group*.	
Project Process Groups	The five process groups required for any project, which have clear dependencies and are required to be performed in the same sequence on each project, independent of the application area or the specifics of the applied project life cycle. The process groups are initiating, planning, executing, monitoring and controlling, and closing.	
Project Schedule [Output/ Input]	The planned dates for performing schedule activities and the planned dates for meeting schedule milestones.	
Project Schedule Network Diagram [Output/ Input]	Any schematic display of the logical relationships among the project schedule activities. Always drawn from left to right to reflect project work chronology.	
Project Scope	The work that must be performed to deliver a product, service, or result with the specified features and functions.	
Project Scope Management [Knowledge Area]	See Appendix F.	

Term	Definition	*My notes*
Project Scope Management Plan [Output/ Input]	The document that describes how the project scope will be defined, developed, and verified and how the work breakdown structure will be created and defined, and that provides guidance on how the project scope will be managed and controlled by the project management team. It is contained in or is a subsidiary plan of the project management plan. The project scope management plan can be informal and broadly framed, or formal and highly detailed, based on the needs of the project.	
Project Scope Statement [Output/ Input]	The narrative description of the project scope, including major deliverables, project objectives, project assumptions, project constraints and a statement of work that provides a documented basis for making future project decisions and for confirming or developing a common understanding of project scope among the stakeholders. The definition of the project scope – what needs to be accomplished.	
Project Sponsor	See sponsor.	
Project Stakeholder	See stakeholder.	
Project Summary Work Breakdown Structure (PSWBS) [Tool]	A work breakdown structure for the project that is only developed down to the subproject level of detail within some legs of the WBS, and where the detail of those subprojects are provided by use of contract work breakdown structures.	
Project Team	All the project team members, including the project management team, the project manager and, for some projects, the project sponsor.	
Project Team Directory	A documented list of project team members, their project roles and communication information.	

Term	Definition	*My notes*
Project Team Members	The persons who report either directly or indirectly to the project manager, and who are responsible for performing project work as a regular part of their assigned duties.	
Quality Assurance (QA)	Systematic process of checking to see whether a product or service being developed is meeting specified requirements.	
Quality Control (QC)	A procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer.	
Qualitative Risk Analysis [Process]	The process of prioritising risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact.	
Quality	The degree to which a set of inherent characteristics fulfils requirements.	
Quality Management Plan [Output/ Input]	The quality management plan describes how the project management team will implement the performing organisation's quality policy. The quality management plan is a component or a subsidiary plan of the project management plan. The quality management plan may be formal or informal, highly detailed or broadly framed, based on the requirements of the project.	
Quality Planning [Process]	The process of identifying which quality standards are relevant to the project and determining how to satisfy them.	
Quantitative Risk Analysis [Process]	The process of numerically analysing the effect of identified risks on overall project objectives.	
Regulation	Requirements imposed by a governmental body. These requirements can establish product, process or service characteristics, including applicable administrative provisions that have government-mandated compliance.	

Term	Definition	*My notes*
Reliability	The probability of a product performing its intended function under specific conditions for a given period of time.	
Request for Proposal (RFP)	A type of procurement document used to request proposals from prospective sellers of products or services. In some application areas, it may have a narrower or more specific meaning.	
Request for Quotation (RFQ)	A type of procurement document used to request price quotations from prospective sellers of common or standard products or services. Sometimes used in place of request for proposal and in some application areas, it may have a narrower or more specific meaning.	
Requested Change [Output/ Input]	A formally documented change request that is submitted for approval to the integrated change control process. Contrast with approved change request.	
Reserve	A provision in the project management plan to mitigate cost and/ or schedule risk. Often used with a modifier (e.g. management reserve, contingency reserve) to provide further detail on what types of risk are meant to be mitigated. The specific meaning of the modified term varies by application area.	
Residual Risk	A risk that remains after risk responses have been implemented.	
Resource	Skilled human resources (specific disciplines either individually or in crews or teams), equipment, services, supplies, commodities, materiel, budgets, or funds.	
Resource Breakdown Structure (RBS)	A hierarchical structure of resources by resource category and resource type used in resource levelling schedules and to develop resource limited schedules, and which may be used to identify and analyse project human resource assignments.	

Term	Definition	*My notes*
Resource Calendar	A calendar of working days and nonworking days that determines those dates on which each specific resource is idle or can be active. Typically defines resource specific holidays and resource availability periods. See also project calendar.	
Resource-Constrained Schedule	See resource-limited schedule.	
Resource Histogram	A bar chart showing the amount of time that a resource is scheduled to work over a series of time periods. Resource availability may be depicted as a line for comparison purposes. Contrasting bars may show actual amounts of resource used as the project progresses.	
Resource Levelling [Technique]	Any form of schedule network analysis in which scheduling decisions (start and finish dates) are driven by resource constraints (e.g. limited resource availability or difficult-to-manage changes in resource availability levels).	
Resource-Limited Schedule	A project schedule whose schedule activity, scheduled start dates and scheduled finish dates reflect expected resource availability. A resource limited schedule does not have any early or late start or finish dates. The resource-limited schedule total float is determined by calculating the difference between the critical path method late finish date* and the resource-limited scheduled finish date. Sometimes called resource-constrained schedule. See also resource levelling.	
Resource Planning	See activity resource estimating.	
Responsibility Assignment Matrix (RAM) [Tool]	A structure that relates the project organisational breakdown structure to the work breakdown structure to help ensure that each component of the project's scope of work is assigned to a responsible person.	

Term	Definition	*My notes*
Rework	Action taken to bring a defective or nonconforming component into compliance with requirements or specifications.	
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives. See also risk category and risk breakdown structure.	
Risk Acceptance [Technique]	A risk response planning technique* that indicates that the project team has decided not to change the project management plan to deal with a risk, or is unable to identify any other suitable response strategy.	
Risk Avoidance [Technique]	A risk response planning technique* for a threat that creates changes to the project management plan that are meant to either eliminate the risk or to protect the project objectives from its impact. Generally, risk avoidance involves relaxing the time, cost, scope, or quality objectives.	
Risk Category	A group of potential causes of risk. Risk causes may be grouped into categories such as technical, external, organisational, environmental, or project management. A category may include subcategories such as technical maturity, weather, or aggressive estimating.	
Risk Identification [Process]	The process of determining which risks might affect the project and documenting their characteristics.	

Term	Definition	*My notes*
Risk Management Plan [Output/ Input]	The document describing how project risk management will be structured and performed on the project. It is contained in or is a subsidiary plan of the project management plan. The risk management plan can be informal and broadly framed or formal and highly detailed, based on the needs of the project. Information in the risk management plan varies by application area and project size. The risk management plan is different from the risk register that contains the list of project risks, the results of risk analysis and the risk responses.	
Risk Management Planning [Process]	The process of deciding how to approach, plan, and execute risk management activities for a project.	
Risk Mitigation [Technique]	A risk response planning technique* associated with threats that seeks to reduce the probability of occurrence or impact of a risk to below an acceptable threshold.	
Risk Monitoring and Control [Process]	The process of tracking identified risks, monitoring residual risks, identifying new risks, executing risk response plans, and evaluating their effectiveness throughout the project life cycle.	
Risk Register [Output/ Input]	The document containing the results of the qualitative risk analysis, quantitative risk analysis and risk response planning. The risk register details all identified risks, including description, category, cause, probability of occurring, impact(s) on objectives, proposed responses, owners and current status. The risk register is a component of the project management plan.	
Risk Response Planning [Process]	The process of developing options and actions to enhance opportunities and to reduce threats to project objectives.	

Term	Definition	*My notes*
Risk Transference [Technique]	A risk response planning technique* that shifts the impact of a threat to a third party, together with ownership of the response.	
Root Cause Analysis [Technique]	An analytical technique used to determine the basic underlying reason that causes a variance or a defect or a risk. A root cause may underlie more than one variance or defect or risk.	
Schedule	See project schedule and see also schedule model.	
Schedule Activity	A discrete scheduled component of work performed during the course of a project. A schedule activity normally has an estimated duration, an estimated cost and estimated resource requirements. Schedule activities are connected to other schedule activities or schedule milestones with logical relationships and are decomposed from work packages.	
Schedule Analysis	See schedule network analysis.	
Schedule Control [Process]	The process of controlling changes to the project schedule.	
Schedule Development [Process]	The process of analysing schedule activity sequences, schedule activity durations, resource requirements and schedule constraints to create the project schedule.	
Schedule Management Plan [Output/ Input]	The document that establishes criteria and the activities for developing and controlling the project schedule. It is contained in, or is a subsidiary plan of, the project management plan. The schedule management plan may be formal or informal, highly detailed or broadly framed, based on the needs of the project.	
Schedule Network Analysis [Technique]	The technique of identifying early and late start dates*, as well as early and late finish dates*, for the uncompleted portions of project schedule activities. See also critical path method, critical chain method, what-if analysis and resource levelling.	

Term	Definition	*My notes*
Schedule Performance Index (SPI)	A measure of schedule efficiency on a project. It is the ratio of earned value (EV) to planned value (PV). The SPI = EV divided by PV. An SPI equal to or greater than one indicates a favourable condition and a value of less than one indicates an unfavourable condition. See also earned value management.	
Schedule Variance (SV)	A measure of schedule performance on a project. It is the algebraic difference between the earned value (EV) and the planned value (PV). SV = EV minus PV. See also earned value management.	
Scheduled Finish Date (SF)	The point in time that work was scheduled to finish on a schedule activity. The scheduled finish date is normally within the range of dates delimited by the early finish date and the late finish date. It may reflect resource levelling of scarce resources. Sometimes called planned finish date.	
Scheduled Start Date (SS)	The point in time that work was scheduled to start on a schedule activity. The scheduled start date is normally within the range of dates delimited by the early start date and the late start date. It may reflect resource levelling of scarce resources. Sometimes called planned start date.	
Scope	The sum of the products, services and results to be provided as a project. See also project scope and product scope.	
Scope Baseline	See baseline.	
Scope Change	Any change to the project scope. A scope change almost always requires an adjustment to the project cost or schedule.	
Scope Control [Process]	The process of controlling changes to the project scope.	
Scope Creep	Adding features and functionality (project scope) without addressing the effects on time, costs, and resources, or without customer approval.	

Term	Definition	*My notes*
Scope Definition [Process]	The process of developing a detailed project scope statement as the basis for future project decisions.	
Scope Planning [Process]	The process of creating a project scope management plan.	
Scope Verification [Process]	The process of formalising acceptance of the completed project deliverables.	
S-Curve	Graphic display of cumulative costs, labour hours, percentage of work, or other quantities, plotted against time. The name derives from the S-like shape of the curve (flatter at the beginning and end, steeper in the middle) produced on a project that starts slowly, accelerates, and then tails off. Also a term for the cumulative likelihood distribution that is a result of a simulation, a tool of quantitative risk analysis.	
Secondary Risk	A risk that arises as a direct result of implementing a risk response.	
Sensitivity Analysis	A quantitative risk analysis and modelling technique used to help determine which risks have the most potential impact on the project. It examines the extent to which the uncertainty of each project element affects the objective being examined when all other uncertain elements are held at their baseline values. The typical display of results is in the form of a tornado diagram.	
Service	Useful work performed that does not produce a tangible product or result, such as performing any of the business functions supporting production or distribution. Contrast with product and result. See also deliverable.	

Term	Definition	*My notes*
Simulation	A simulation uses a project model that translates the uncertainties specified at a detailed level into their potential impact on objectives that are expressed at the level of the total project. Project simulations use computer models and estimates of risk, usually expressed as a probability distribution of possible costs or durations at a detailed work level, and are typically performed using Monte Carlo analysis.	
Skill	Ability to use knowledge, a developed aptitude, and/ or a capability to effectively and readily execute or perform an activity.	
Slack	See total float and free float.	
Specification	A document that specifies, in a complete, precise, verifiable manner, the requirements, design, behaviour, or other characteristics of a system, component, product, result, or service and, often, the procedures for determining whether these provisions have been satisfied. Examples are: requirement specification, design specification, product specification, and test specification.	
Specification Limits	The area, on either side of the centreline, or mean, of data plotted on a control chart that meets the customer's requirements for a product or service. This area may be greater than or less than the area defined by the control limits. See also control limits.	
Sponsor	The person or group that provides the financial resources, in cash or in kind, for the project.	
Stakeholder	Persons and organisations, such as customers, sponsors, performing organisation and the public, who are actively involved in the project, or whose interests may be positively or negatively affected by execution or completion of the project. They may also exert influence over the project and its deliverables.	

Term	Definition	*My notes*
Standard	A document established by consensus and approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.	
Start Date	A point in time associated with a schedule activity's start, usually qualified by one of the following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.	
Start-to-Finish (SF)	The logical relationship where completion of the successor schedule activity is dependent upon the initiation of the predecessor schedule activity. See also logical relationship.	
Start-to-Start (SS)	The logical relationship where initiation of the work of the successor schedule activity depends upon the initiation of the work of the predecessor schedule activity. See also logical relationship.	
Statement of Work (SOW)	A narrative description of products, services or results to be supplied.	
Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis	This information gathering technique examines the project from the perspective of each project's strengths, weaknesses, opportunities and threats to increase the breadth of the risks considered by risk management.	
Successor Activity	The schedule activity that follows a predecessor activity, as determined by their logical relationship.	
Summary Activity	A group of related schedule activities aggregated at some summary level, and displayed/ reported as a single activity at that summary level. See also subproject and sub-network.	
Target Completion Date (TC)	An imposed date that constrains or otherwise modifies the schedule network analysis.	

Term	Definition	*My notes*
Target Finish Date (TF)	The date that work is planned (targeted) to finish on a schedule activity.	
Target Schedule	A schedule adopted for comparison purposes during schedule network analysis, which can be different from the baseline schedule. See also baseline.	
Target Start Date (TS)	The date that work is planned (targeted) to start on a schedule activity.	
Task	A term for work whose meaning and placement within a structured plan for project work varies by the application area, industry and brand of project management software.	
Technique	A defined systematic procedure employed by a human resource to perform an activity to produce a product or result or deliver a service, and that may employ one or more tools.	
Template	A partially complete document in a predefined format that provides a defined structure for collecting, organising and presenting information and data. Templates are often based upon documents created during prior projects. Templates can reduce the effort needed to perform work and increase the consistency of results.	
Threat	A condition or situation unfavourable to the project; a negative set of circumstances; a negative set of events; a risk that will have a negative impact on a project objective if it occurs; or a possibility for negative changes. Contrast with opportunity.	
Three-Point Estimate [Technique]	An analytical technique that uses three cost or duration estimates to represent the optimistic, most likely, and pessimistic scenarios. This technique is applied to improve the accuracy of the estimates of cost or duration when the underlying activity or cost component is uncertain.	

Term	Definition	*My notes*
Time and Material (T&M) Contract	A type of contract that is a hybrid contractual arrangement containing aspects of both cost-reimbursable and fixed-price contracts. Time and material contracts resemble cost-reimbursable type arrangements in that they have no definitive end, because the full value of the arrangement is not defined at the time of the award. Thus, time and material contracts can grow in contract value as if they were cost-reimbursable-type arrangements. Conversely, time and material arrangements can also resemble fixed-price arrangements. For example, the unit rates are pre-set by the buyer and seller, when both parties agree on the rates for the category of senior engineers.	
Time-Now Date	See data date.	
Time-Scaled Schedule Network Diagram [Tool]	Any project schedule network diagram drawn in such a way that the positioning and length of the schedule activity represents its duration. Essentially, it is a bar chart that includes schedule network logic.	
Total Float (TF)	The total amount of time that a schedule activity may be delayed from its early start date without delaying the project finish date, or violating a schedule constraint. Calculated using the critical path method technique and determining the difference between the early finish dates and late finish dates. See also free float.	
Total Quality Management (TQM) [Technique]	A common approach to implementing a quality improvement program within an organisation.	

Term	Definition	*My notes*
Trend Analysis [Technique]	An analytical technique that uses mathematical models to forecast future outcomes based on historical results. It is a method of determining the variance from a baseline of a budget, cost, schedule or scope parameter by using prior progress reporting periods' data and projecting how much that parameter's variance from baseline might be at some future point in the project if no changes are made in executing the project.	
Triggers	Indications that a risk has occurred or is about to occur. Triggers may be discovered in the risk identification process and watched in the risk monitoring and control process. Triggers are sometimes called risk symptoms or warning signs.	
Triple Constraint	A framework for evaluating competing demands. The triple constraint is often depicted as a triangle where one of the sides or one of the corners represent one of the parameters being managed by the project team.	
User	The person or organisation that will use the project's product or service. See also customer.	
Validation [Technique]	The technique of evaluating a component or product during or at the end of a phase or project to ensure it complies with the specified requirements. Contrast with verification.	
Value Engineering (VE)	A creative approach used to optimise project life cycle costs, save time, increase profits, improve quality, expand market share, solve problems, and/ or use resources more effectively.	
Variance	A quantifiable deviation, departure, or divergence away from a known baseline or expected value.	

Term	Definition	*My notes*
Variance Analysis [Technique]	A method for resolving the total variance in the set of scope, cost, and schedule variables into specific component variances that are associated with defined factors affecting the scope, cost and schedule variables.	
Verification [Technique]	The technique of evaluating a component or product at the end of a phase or project to assure or confirm it satisfies the conditions imposed. Contrast with validation.	
Virtual Team	A group of persons with a shared objective who fulfil their roles with little or no time spent meeting face to face. Various forms of technology are often used to facilitate communication among team members. Virtual teams can be comprised of persons separated by great distances.	
Work Authorisation [Technique]	A permission and direction, typically written, to begin work on a specific schedule activity or work package or control account. It is a method for sanctioning project work to ensure that the work is done by the identified organisation, at the right time, and in the proper sequence.	
Work Authorisation System [Tool]	A subsystem of the overall project management system. It is a collection of formal documented procedures that defines how project work will be authorised (committed) to ensure that the work is done by the identified organisation, at the right time, and in the proper sequence. It includes the steps, documents, tracking system and defined approval levels needed to issue work authorisations.	

Term	Definition	*My notes*
Work Breakdown Structure (WBS) [Output/ Input]	A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organises and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages. The deliverable orientation of the hierarchy includes both internal and external deliverables. See also work package, control account, contract work breakdown structure and project summary work breakdown structure.	
Work Breakdown Structure Component	An entry in the work breakdown structure that can be at any level.	
Work Breakdown Structure Dictionary [Output/ Input].	A document that describes each component in the work breakdown structure (WBS). For each WBS component, the WBS dictionary includes a brief definition of the scope or statement of work, defined deliverable(s), a list of associated activities, and a list of milestones. Other information may include: responsible organisation, start and end dates, resources required, an estimate of cost, charge number, contract information, quality requirements and technical references to facilitate performance of the work.	
Work Package	A deliverable or project work component at the lowest level of each branch of the work breakdown structure. The work package includes the schedule activities and schedule milestones required to complete the work package deliverable or project work component. See also control account.	

Learning Unit 1: Introduction to Project Management Techniques

Material used for this Learning Unit: • Prescribed text pp.16–35.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.16–35 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ What is the main focus area of the discipline?
  ○ How would you define a project?
  ○ How would you define project management?
  ○ Are there different types of projects? If so, how do you define them?	

2 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

Find some more information on the web about the ISO quality standards. Identify which standard refers specifically to Project Management. Think about how this standard would assist you when managing a project.

3 Recommended Digital Engagement and Activities

Identify the websites for the following organisations:

- Association of Project Managers (UK);
- Project Management Institute (USA);
- International Association of Project Managers;
- Australian Institute of Project Managers.

Record their website addresses for future reference.

***Different Approaches*:**
With HC students be sure to focus more on the background info. Diploma and Degree students should also be able to describe the linkages to other subject areas. Degree students must be able to reflect critically on the field and its relationship to others.

4 Interactive Work Space

4.1 Izimvo Exchange 1

Work in a group of four students. Identify four major infrastructure projects currently in progress or recently completed in South Africa. Each student in the group should take one of the projects and carry out further research. Background information about the project should be sourced; e.g. Which organisation is responsible for the project? Who are the stakeholders? What is the value of the project? (To the South African community it serves), etc. Share the research with the rest of the group.

4.2 Izimvo Exchange 2

Work in small groups. Imagine that South Africa has been awarded the Olympic Games in 2020. Assume that you are part of the committee required to project manage the production of the Olympic Games. Using the PMBOK nine areas of knowledge, identify an outline plan for the management process.

4.3 Activity 1

Purpose:
Identify the role that Project Managers play in a project.

Task:
Outline the role of the project manager by identifying at least 14 different areas of responsibility and tasks carried out by the Project Manager.

Commentary Related to Activity Design:
N/A

4.4 Activity 2

Purpose:
Define Project Management.

Task:
Explain what Project Management is, and why it is different to other forms of management.

Activities (LU1)

- Give students an overview of the course and assessments (key elements of subject);
- Encourage in-class communication;
- Ask students what they think the course will be about and use this as a discussion point;
- Ask if students have ever been involved in managing a project – most will say no. Point out that a project can be anything from baking a cake to building the Gautrain – so most students have practised project management albeit at a limited level;
- Ask students to write down the steps and processes they would go through to decorate their bedroom. Discuss the steps as a class to try and get an idea of a logical process to the project.

"Project managers function as bandleaders who pull together their players each a specialist with individual score and internal rhythm. Under the leader's direction, they all respond to the same beat."
– L.R. Sayles

Commentary Related to Activity Design:
N/A

For Activity 2 consult pp.24–25 in the textbook.

4.5 Revision Exercise 1

1. Detail the PMBOK 10 areas of project management knowledge. Provide a brief explanation of each area.

2. The performance of the Project Manager is crucial to the success of any project, since he/ she is the person responsible for ensuring that it reaches a successful conclusion. Identify what personal skills you believe a successful Project Manager would have. Rank them in order of importance.

3. The ultimate purpose of a company and project is to be successful. Success in this regard is dependent on how one determines project success. Differentiate between success from the project manager's perspective and the project sponsor's perspective.

Notes on Exercise 1:
Advise students to view the various Project Management websites they identified in the Digital Engagement Activity.

4.6 Revision Exercise 2

1. Project Management is about the application of knowledge, skills, tools and techniques so that the project can be defined, planned, monitored, controlled and delivered in order to achieve its agreed benefits. How would you identify whether or not a project is successful? List those items that you would look at to determine a project's success.

2. The benefits of using a project management approach follow on from addressing the needs of a project. The Project Manager is responsible for developing a plan through which a project can be controlled.

   2.1 By consulting a variety of resources, identify at least eight benefits of the project management approach.

   2.2 Identify at least three disadvantages of the project management approach.

   2.3 Do you think using a project management approach will suppress innovative and imaginative thought during the project lifecycle? Give reasons and examples in your answer.

Possible Resources:

- Amusing, light hearted introduction to project management: *Project Management with Monkeys.* 2009. [Video online]. https://www.youtube.com/watch?v=HDu5Wo8Yh1k [Accessed 17 May 2014].;
- Interesting video showing what can happen when poor project management takes place. *Titanic – Project Management Blunders.* 2012. Video online]. Available at: http://www.youtube.com/watch?v=wbvfir2x344 [Accessed 17 May 2014].;
- *A Day in the Life: Construction Project Management.* 2009. Video online]. Available at: http://www.youtube.com/watch?v=5vStHoQJSvc [Accessed 17 May 2014].

Revision for Test

Activities:

- Revise Learning Units 1–9.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:

- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise 1

Questions:		**Model Solutions:**
1.	Detail the PMBOK 10 areas of project management knowledge. Give a brief explanation of each area detailed.	Prescribed textbook p.25.
2.	The performance of the Project Manager is crucial to the success of any project, since he or she is the person responsible for ensuring that it reaches a successful conclusion. Identify what personal skills you believe a successful project manager would have. Rank them in order of importance.	Prescribed textbook pp.30–31. The order of importance is dependent on the project being considered. What is important is the student's ability to argue and justify the order in which they have ranked each personal skill.
3.	The ultimate purpose of a company and project is to be successful. Success in this regard is dependent on how one determines project success. Differentiate between success from the project manager's perspective and the project sponsor's perspective.	Prescribed textbook p.34.

Revision Exercise 2

Questions:	Model Solutions:
1. Project Management is about the application of knowledge, skills, tools and techniques so that the project can be defined, planned, monitored, controlled and delivered in order to achieve its agreed benefits. How would you identify whether or not a project is successful? List those items that you would look at to determine a project's success.	One way to identify whether a project is successful is to ask the following questions: • Did the project achieve its time, cost and quality objectives? • Does the project meet the customer's perceived requirements? • Does the project's outcome make the client want to come back to do further business? • Has the project been completed leaving the project organisation fit and able to continue further work?
2. The benefits of using a project management approach follow on from addressing the needs of a project. The project manager is responsible for developing a plan through which a project can be controlled. 2.1 By consulting a variety of resources, identify at least eight benefits of the project management approach. 2.2 Identify at least three disadvantages of the project management approach. *2.3* Do you think using a project management approach will suppress innovative and imaginative thought during the project lifecycle? Give reasons and examples in your answer.	Students are required to research this set of questions from a variety of resources.

Learning Unit 2: Project Lifecycle	
Material used for this Learning Unit: • Prescribed text pp.36–49.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read pp.36–49 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What are the four phases of a project life-cycle? ○ What is the difference between the "project lifecycle" and the "product lifecycle"? ○ How does the level of effort exerted over the phases of a project vary? ○ What is the relationship between the level of effort and cost at each phase within a project?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

Project Management in NGO's:
http://www.projectmanagement.org.za/images/worldvision_pmsa.pdf

"Trying to manage a project without project management is like trying to play a football game without a game plan."
– K. Tate (Past Board Member, PMI)

"Everyone needs deadlines."
– Walt Disney

2 Recommended Digital Engagement and Activities

View the following video:

Top Ten Terms Project Managers Use. 2012. [Video online]. Available at: http://www.youtube.com/watch?v=7c8xP1gRIWs [Accessed 17 May 2014].

Review the following:

The Open University. 2014. *Project management: the start of the project journey.* [Online]. Available at: http://www.open.edu/openlearn/money-management/management/leadership-and-management/managing/project-management-the-start-the-project-journey/content-section-5 [Accessed 17 May 2014].

3 Interactive Work Space

3.1 Izimvo Exchange 1

In a group of four select an infrastructure project with which you are familiar. Divide the project into each of the project phases.

3.2 Izimvo Exchange 2

Now split the same group up into two halves. One half is to discuss the way in which the level of effort exerted throughout the project will vary and the other group is required to predict the way in which the costs for the project will vary. Now as a group, share your discussions. It is important that you are able to justify your points raised.

3.3 Activity 1

Purpose:
To ensure the student fully understands the project lifecycle and its application to a project.

Task:
The project lifecycle enables the project manager to look at the total picture. Prepare a short written report on how the project lifecycle can be applied to a book publishing project. Consider the following:

- The phases of the lifecycle, particularly if they are different to the classic four phase model;
- The product lifecycle from concept to disposal. Outline how design considerations at the outset influence how upgrades and refits (new editions) happen downstream in the lifecycle;
- Using Figure 2.2 on p.38, detail the inputs specific to the above project into the same format;
- Similarly, detail the output specific to this project.

Commentary Related to Activity Design:
N/A

3.4 Activity 2

Purpose:
To build and encourage a national/ international knowledge of major infrastructure projects and their management.

Task:
Read the following articles about the Gautrain project and make a half page summary on each of them paying particular attention to the project lifecycle:

Civil Engineering, 17(6), July. [Online]. Available at: http://www.saice.org.za/downloads/monthly_publications/2009/2009-Civil%20July.pdf [Accessed 17 May 2014].

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise 1

1. The project lifecycle subdivides the project's timeline into a number of sequential phases. Each phase is characterised by certain features. List and explain any five of these features.

2. The project lifecycle is often presented with its associated level of effort. List any three measures of effort than can be used as an indication of the effort being expended at each phase of the project.

3. Using any one of the measures listed in your answer to the question above; illustrate the level of effort graphically.

3.6 Revision Exercise 2

Choose the most correct option for Question 1–3.

1. The compilation of all the phases within a project equates to:
   1.1 The project lifecycle;
   1.2 The product lifecycle;
   1.3 Project completion;
   1.4 Project processes.

2. Which of the following describes the early stages of a project?
   2.1 High costs and high demand for resources;
   2.2 A high demand for change;
   2.3 A high demand for project team time;
   2.4 Low costs and low demand for resources.

3. At which point is the risk of failure the least, but the consequences of failure the highest?
   3.1 During the early stages;
   3.2 During the middle stages;
   3.3 During the final stages;
   3.4 Risk of failure is even across all phases.

Revision for Test

Activities:

- Revise Learning Units 1–2.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:

- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work (work in test conditions) and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise 1

Questions:	Model Solutions:
1. The project lifecycle subdivides the project's timeline into a number of sequential phases. Each phase is characterised by certain features. List and explain any five of these features.	Prescribed textbook p.40. Students can list and explain any of the following characteristics of phases of a project lifecycle: • Phase deliverable; • Beneficial grouping; • Phase name; • Sequential; • Fast-track; • Time constraints; • Project control; • Go/ No-go Decision
2. The project lifecycle is often presented with its associated level of effort. List any three measures of effort than can be used as an indication of the effort being expended at each phase of the project.	Prescribed textbook p.41.
3. Using any one of the measures listed in your answer to the question above, illustrate the level of effort graphically.	Prescribed textbook p.41.

Revision Exercise 2

Questions:	Model Solutions:
1. The compilation of all the phases within a project equates to: 1.1 The project lifecycle; 1.2 The product lifecycle; 1.3 Project completion; 1.4 Project processes.	1.1
2. Which of the following describes the early stages of a project? 2.1 High costs and high demand for resources; 2.2 A high demand for change; 2.3 A high demand for project team time; 2.4 Low costs and low demand for resources.	2.4
3. At which point is the risk of failure the least but the consequences of failure the highest? 3.1 During the early stages; 3.2 During the middle stages; 3.3 During the final stages; 3.4 Risk of failure is even across all phases.	3.3

Learning Unit 3: Project Methodology	
Material used for this Learning Unit: • Prescribed text pp.58–67	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read pp.58–67 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What is a Project Management Systems Approach? ○ What are the four main phases in the Project Management Process? ○ What are the sub-sections of each of the four main phases in the Project Management Process?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Access the links below:

Silva, CA and Ferrão, P. 2009. *A systems modelling approach to project management: The Green Islands project example.* [Online]. Available at: http://esd.mit.edu/symp09/submitted-papers/silva-carlos-paper.pdf [Accessed 17 May 2014].

The Process Approach to Quality Management Systems, ISO 9001. 2013. [Video online]. Available at: http://www.youtube.com/watch?v=KPNTKxBJ4Nk [Accessed 17 May 2014]

Top Ten Terms Project Managers Use. 2012. [Video online]. Available at: http://www.youtube.com/watch?v=7c8xP1gRIWs [Accessed 17 May 2014].

Resources:
The academic article titled, *A Systems Modelling Approach to Project Management: The Green Islands Project Example* may prove to be complicated. Encourage students to focus on the main themes of the article as opposed to the detail.

3 Interactive Work Space

3.1 Izimvo Exchange

In groups of no more than three students, find examples of systems approaches taken towards activities. These approaches can then be presented to the class by a selected member of the group. If possible, the groups are to illustrate their systems on the board to further clarify their understanding of their chosen systems approach.

Resources:
Use the link below to explain the project Management Systems Approach:
The Process Approach to Quality Management Systems, ISO 9001. 2013. [Video online]. Available at: http://www.youtube.com/watch?v=KPNTKxBJ4Nk [Accessed 17 May 2014].

3.2 Activity

Purpose:
To ensure that students fully understand the four project management processes, which in turn can be further sub-divided into a number of sub-processes.

Approach to Activity:
Encourage groups to be as creative as possible and provide examples that relate to scenarios relevant to their peers. This ensures that their peers will identify with the concepts that they are trying to communicate.

Task:
Divide the class into four groups. Each group is allocated one of the four project management processes: initiation, planning, execution and closing. It is the task of each group to agree upon a creative and worthwhile way in which to teach their peers about their respective project management process. For example, the group to whom the "initiation process" was awarded is required to teach their peers about the sub-processes that comprise this process. Groups are required to use appropriate examples to assist them in their communication of exactly what their process is. It is also extremely important for each group to integrate systems thinking into their presentations. In other words, each group must explain how their particular process is relevant to each of the other three processes.

Commentary Related to Activity Design:
N/A

3.3 Revision Exercise

Revision Exercise:
Students are required to choose projects with which they are familiar and about which they are easily able to obtain information. Students are not required to go into too much detail but rather demonstrate an understanding of each process and its accompanying sub-processes by applying it to their chosen context.

1. Choose a small project. For that project, develop a mind map, which is explained using the four main sections. Each section must be titled as each of the four processes of project management. Leading off each of these processes must be the sub-processes associated with that process. Then, each sub-process must be explained within the context of the chosen project.

The result will be one large mind map, which comprehensively details each main process and its accompanying sub-processes contextualised within the chosen project.

2. On the same mind map, link relevant sections with a series of coloured arrows with the aim of demonstrating an understanding of the systems approach to project management. The various aspects of the mind map will relate to one another. The coloured arrows inserted into the mind map are representative of this interconnectedness.

Revision for Test

Activities:

- Revise Learning Units 1–3.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:

- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

3.4 Revision Exercise 1

Questions:	Model Solutions:
1. Choose a small project. For that project, develop a mind map, which comprises of four main sections. Each section must be titled as each of the four processes of project management. Leading off each of these processes must be the sub-processes associated with that process. Then, each sub-process must be explained within the context of the chosen project. The result will be one large mind map, which comprehensively details each main process and its accompanying sub-processes contextualised within the students chosen project.	Use the information on pp.62–65 to assess the students' understands of the project management processes. Evidence of the students' understandings will be clearest in their ability to apply each process and subsequent sub-process to their chosen project.
2. On the same mind map, link relevant sections with a series of coloured arrows with the aim of demonstrating an understanding of the systems approach to project management. The various aspects of the mind map will relate to one another. The coloured arrows inserted into the mind map are representative of this interconnectedness.	Similarly, the extent of the interconnectedness will depend on the project chosen by the student.

Learning Unit 4: Project Stakeholder Management

Material used for this Learning Unit:	*My Notes on this Learning Unit:*
• Prescribed text pp.68–77.	
How to prepare for this Learning Unit: • Before the first class, be sure that you read pp.68–77 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ Define the term “stakeholder”. ○ Compare project stakeholders at each part of the project lifecycle; ○ Find examples of actual stakeholders in actual projects with which you are familiar.	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

1. View the film Ocean’s 11. Try and identify the various concepts of project management that you have already learned. For example:
   - Try and identify the project manager and the project team;
   - Identify project stakeholders.

   When you have completed this exercise view the following video:

   Project Management Ocean's Style. 2011. [Video online]. Available at: http://www.youtube.com/watch?v=qtScQ1d5Krg [Accessed 17 May 2014].

Digital Engagement:
Try and do the digital engagement as a class exercise. Obtain a copy of Ocean’s 11 and show the class. Ask the students to identify the various PM concepts as you go through the film. On completion show the short YouTube video giving a summary of the project management techniques used in Ocean’s 11.

Izimvo Exchange 1:
It is important that the projects chosen are diverse so that the stakeholders identified by the students vary between projects. It is the role of the lecturer to facilitate the choice of each set of projects by the various groups.

2. Locate and read the following academic paper on stakeholder classification:

   Mainardes, E, Alves, H and Raposo, M. 2012. A model for stakeholder classification and stakeholder relationships. *Management Decision*, 50(10), pp.1861–1879, Business Source Premier, EBSCOhost, [Accessed 4 February 2013].

3 Interactive Work Space

3.1 Izimvo Exchange 1

Choose any three projects. Each project must fall within a different industry. In groups of between four and five, discuss all of the stakeholders involved in each project. Then, each group is to describe their three chosen project to the class and list the stakeholders identified.

3.2 Izimvo Exchange 2

Having identified each of the stakeholders associated with the chosen projects; describe each project according to its various phases. Then assign the identified stakeholders with each phase of the projects.

3.3 Activity

Purpose:
Help students to understand why the identification of stakeholders is so important.

Task: Class Debate
Within the class, choose a fictitious project. Describe the project in great detail.

Using the information provided on pp.73–77 in the prescribed textbook, discuss the stakeholders that would be associated with each phase of the project. Hold the debate during class period.

Commentary Related to Activity Design:
Ensure that you are professional at all times during the debate – imagine you are in a workplace environment and are there to support the views of your project team.

Digital Engagement and Activities:

- Start by asking the students to provide as many examples of project stakeholders as possible;
- Encourage in-class communication – in particular, look at the difference between internal and external stakeholders;
- Ask the students to prepare a lifecycle matrix for a project of their choice. Get them to complete the matrix from the viewpoint of three different stakeholders – the idea is to get the students to understand how different stakeholders have different needs from a project – and the role the project manager has in trying to satisfy them all.

Advice for class debate
Encourage all of the students to contribute towards the class discussion. Guide the class's choice of project that will include as many of the stakeholders listed on pp.73–77 of the prescribed textbook so as to ensure that the students obtain an appreciation for the diversity of the stakeholders that could be involved in projects as well as an understanding of the need for the project team to identify all stakeholders associated with projects.

3.4 Revision Exercise 1

1. With reference to a specific project, explain who a project stakeholder is.

2. List and explain each of the four steps associated with project stakeholder management.

3. Why is it that the stakeholders associated with each phase of a project lifecycle change?

3.5 Revision Exercise 2

1. Describe each of the following stakeholders' roles within a project:
   - Functional Managers;
   - Contractors;
   - Suppliers;
   - Users;
   - Lobby groups;
   - Regulators;
   - Competitors.

Revision for Test

Activities:

- Revise Learning Units 1–4.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:

- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise 1

Questions:	**Model Solutions:**
1. With reference to a specific project, explain who a project stakeholder is.	Prescribed textbook p.69.
2. List and explain each of the four steps associated with project stakeholder management.	Prescribed textbook p.69.
3. Why is it that the stakeholders associated with each phase of a project lifecycle change?	Prescribed textbook p.70. Each phase produces a different set of deliverables and therefore one would assume that the stakeholders would require a different set of skills.

Revision Exercise 2

Questions:	***Model Solutions:***
1. Describe each of the following stakeholders' roles within a project: • Functional Managers; • Contractors; • Suppliers; • Users; • Lobby groups; • Regulators; • Competitors.	Prescribed textbook pp.73–77.

Learning Unit 5: Project Feasibility Phase	
Material used for this Learning Unit: • Prescribed text pp.88–101.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read pp.88–101 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What takes place during the feasibility phase? ○ Where does the feasibility phase fit into the project lifecycle? ○ What are the products of the feasibility phase? ○ What are the different types of constraints researched during the feasibility phase?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

1. View the film Ocean's 11. Try and identify the various concepts of project management that you have already learned. For example:
   - Identify the feasibility study carried out;
   - Identify internal and external project constraints.

2. When you have completed this exercise view the following video:

   Project Management Ocean's Style. 2011. [Video online]. Available at: http://www.youtube.com/watch?v=qtScQ1d5Krg [Accessed 17 May 2014].

Digital Engagement:
Try and do the digital engagement as a class exercise. Obtain a copy of Ocean's 11 and show the class. Ask the students to identify the various PM concepts as you go through the film. On completion show the short YouTube video giving a summary of the project management techniques used in Ocean's 11.

Activities:
- Start by asking the students to discuss the objectives of a feasibility study;
- Encourage in-class communication – in particular to discuss the products of feasibility studies.

3. In groups of three to four, design a fictitious Project Charter for Ocean's 11. Study the template of the Project Charter provided on p.91 of the prescribed textbook and insert all of the relevant information.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Work in groups of six to eight. Each group is to discuss the risks associated with:

- Not conducting a feasibility study at all;
- Not conducting a comprehensive feasibility study at the correct point in the project lifecycle;
- Once sufficient time has been allocated towards conducting such discussions, each group is to summarise their findings and present them to the class.

3.2 Izimvo Exchange 2

Work in pairs and carry out some research on the following topic:

- Choose two examples from recent news media and explain why their project failed with relevance to the project's feasibility study.

3.3 Activity 1

Purpose:
Help students to understand why feasibility studies are required.

Task: Class Debate
Divide the class into two groups. Each group is to take one side of the debate to research and prepare their arguments.

1. A feasibility study should always be carried out prior to commencing a project because…

2. A feasibility study is not necessary prior to commencing a project because…

Hold the debate during class period.

Activities:
It is important for each group to share their ideas with their peers so as to ensure greater exposure to a wide variety of ideas generated throughout the class.

Possible feasibility studies for Izimvo Exchange 1:
A London Olympic Bid for 2012. [Online]. Available at: http://www.publications.parliament.uk/pa/cm200203/cmselect/cmcumeds/268/268.pdf [Accessed 17 May 2014].

http://www.hm-treasury.gov.uk/d/world_cup_feasibility.pdf

Advice for class debate:
Busy Teacher. 2014. *Essential tips for conducting a class debate*. [Online]. Available at: http://busyteacher.org/7245-conducting-class-debate-essential-tips.html [Accessed 17 May 2014].

Make sure you attend the EBSCOhost seminars!

Commentary Related to Activity Design:
Ensure that you are professional at all times during the debate – imagine you are in a workplace environment and are there to support the views of your project team.

3.4 Activity 2

Purpose:
For students to grasp the concepts of a feasibility study.

Task:
In groups of four, consider a public private partnership in which their responsibility is to complete one of the projects given below:

- Refurbish and operate the Gautrain;
- Build and operate a toll road or toll bridge;
- Build and operate a power station.

Prepare an outline feasibility study to include the following:

- Identification of key stakeholders and the influence they will have on the project;
- Identify your clients' needs and how the project will fulfil those needs;
- Identify any internal and external constraints that you think will have an impact on your project.

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise 1

1. Project constraints need to be identified as early as possible within the project management process so that their limitations can be minimised in the design of the project. Identify which of the following are internal constraints and which are external:

    1.1 Does the company have the technology?

    1.2 Are there any special design requirements?

    1.3 Do you have appropriately qualified personnel to run the project?

    1.4 Is any specialist equipment needed?

1.5 Are there any national or international laws you must adhere to?

1.6 Will any environmental pressure groups get involved with the project?

1.7 Are there any restrictions on working hours?

1.8 Do you need planning permission?

2. Ron is the project manager of a pharmaceutical company that develops multiple products to fight diseases affecting children. There are currently two new drugs that the company is planning to develop within the next two years. Ron has been tasked with determining which of the two drugs has the greatest opportunity for success in today's market place. This is an example of:
   2.1 A business need;
   2.2 A demand;
   2.3 A project selection method;
   2.4 A feasibility study.

3.6 Revision Exercise 2

1. Write T if the statement is true and F is the statement is false.

   1.1 Organisations usually prepare feasibility studies as the first means of starting a project.

   1.2 It is not necessary to identify the stakeholders before a project is planned.

   1.3 The more the authority and the responsibility are shared between the functional and project managers, the better the chances of project success.

   1.4 Stakeholder analysis does not include the ability to help mitigate the project risks.

   1.5 Project requirements can be gathered through brainstorming, focus groups and facilitated workshops.

1.6 Requirements gathering is perhaps the most complex and critical process of any project success.

2. Project selection criteria include:
   2.1 Market need;
   2.2 Technological advancement;
   2.3 Strategic goals of organisation;
   2.4 All of the above.

3. Individuals or organisations who are affected by a project best define:
   3.1 Stakeholders;
   3.2 Customers;
   3.3 Project manager;
   3.4 End users.

4. Stakeholders include:
   4.1 Project team;
   4.2 Customers and users;
   4.3 Upper management;
   4.4 All of the above.

5. A methodology used in incorporating the requirements of those who have an interest in a project best defines:
   5.1 Stakeholder analysis;
   5.2 Stakeholder synthesis;
   5.3 Logical review;
   5.4 Requirements review.

6. Stakeholder analysis includes:
   6.1 Stakeholder characteristics;
   6.2 Ability to affect the project policies through power and/ or leadership;
   6.3 Level of interest of the stakeholder in the specific project;
   6.4 All of the above.

Solutions to Exercises

Revision Exercise 1

Questions:	Model Solutions:
1. Project constraints need to be identified as early as possible within the project management process so that their limitations can be minimised in the design of the project. Identify which of the following are internal constraints and which are external:	
1.1 Does the company have the technology?	
1.2 Are there any special design requirements?	1.1 Internal
1.3 Do you have appropriately qualified personnel to run the project?	1.2 Internal 1.3 Internal
1.4 Is any specialist equipment needed?	1.4 Internal
1.5 Are there any national or international laws you must adhere to?	1.5 External
1.6 Will any environmental pressure groups get involved with the project?	1.6 External
1.7 Are there any restrictions on working hours?	1.7 External
1.8 Do you need planning permission?	1.8 External
2. Ron is the project manager of a pharmaceutical company that develops multiple products to fight diseases affecting children. There are currently two new drugs that the company is planning to develop within the next two years. Ron has been tasked with determining which of the two drugs has the greatest opportunity for success in today's market place. This is an example of:	2.4
2.1 A business need;	
2.2 A demand;	
2.3 A project selection method;	
2.4 A feasibility study.	

3.7 Revision Exercise 2

Questions:	*Model Solutions:*
1. Write T if the statement is true and F is the statement is false.	
1.1 Organisations usually prepare feasibility studies as the first means of starting a project.	1.1 F
1.2 It is not necessary to identify the stakeholders before a project is planned.	1.2 F
1.3 The more the authority and the responsibility are shared between the functional and project managers, the better the chances of project success.	1.3 T

Questions:	***Model Solutions:***
1.4 Stakeholder analysis does not include the ability to help mitigate the project risks. 1.5 Project requirements can be gathered through brainstorming, focus groups and facilitated workshops. 1.6 Requirements gathering is perhaps the most complex and critical process of any project success.	1.4 F 1.5 T 1.6 T
2. Project selection criteria include: 2.1 Market need; 2.2 Technological advancement; 2.3 Strategic goals of organisation; 2.4 All of the above.	2.4
3. Individuals or organisations who are affected by a project best define: 3.1 Stakeholders; 3.2 Customers; 3.3 Project manager; 3.4 End users.	3.1
4. Stakeholders include: 4.1 Project team; 4.2 Customers and users; 4.3 Upper management; 4.4 All of the above.	4.4
5. A methodology used in incorporating the requirements of those who have an interest in a project best defines: 5.1 Stakeholder analysis; 5.2 Stakeholder synthesis; 5.3 Logical review; 5.4 Requirements review.	5.1
6. Stakeholder analysis includes: 6.1 Stakeholder characteristics. 6.2 Ability to affect the project policies through power and/ or leadership. 6.3 Level of interest of the stakeholder in the specific project. 6.4 All of the above.	6.4

Learning Unit 6: Project Definition Phase	
Material used for this Learning Unit: • Prescribed text pp.102–109.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you pp.102–109 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What is a project design? ○ Where within the project lifecycle does the project design phase fit? ○ What is the project design process? ○ What is the importance of a project design philosophy?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Glance through the lengthy document titled, *WWF Introductory Course: Project Design in the Context of Project Cycle Management* by Meg Gawler:

Gawler, M. 2005. *Project design in the context of project cycle management.* [Online]. Available at: http://www.artemis-services.com/downloads/sourcebook_0502.pdf [Accessed 17 May 2014].

Design a mind map to assist you in completing a high level summary of the document. It is only necessary to include the main concepts covered within the document in the mind map. You are not expected to delve into the detail of the document.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Project design is explained in detail on p.103 of the prescribed textbook. The concept can be divided into five aspects:

- Project design process;
- Project design philosophy;
- Model testing;
- Prototype;
- Operational configuration.

In groups of three to four members, discuss how each one of these sub-divisions plays an important role within Project Design.

Izimvo Exchange 1:
As the lecturer, listen to parts of each group's discussions and interject if necessary so as to guide these discussions appropriately and ensure that the students remain on the correct path.

3.2 Izimvo Exchange 2

In your same groups, discuss the need for Model Testing. In your group's opinion, is this a waste of valuable time or is model testing actually extremely worthwhile and necessary?

Izimvo Exchange 2:
By eaves dropping on each of the groups' conversations, play devil's advocate by interrogating ideas and opinions that you may hear being shared within each group. Challenge the students to defend their opinions.

3.3 Activity 1

Purpose:
To design a project design philosophy.

Task:
In groups of three to four members, study the material on pp.105–106 of your textbook. Once you have a sound understanding of characteristics and features of a design philosophy, create your own project design philosophy for a project of your choice.

You will be expected to present your philosophy to your classmates following a brief description of your chosen project.

Commentary Related to Activity Design:
N/A

3.4 Revision Exercise 1

Project design can be divided into five sub-divisions. The below table presents these five sub-divisions and descriptions of each one. Match each sub-division with its corresponding description.

Sub-division		Description	
1	Project design process	**A**	A guide to help the project manager make design choices.
2	Project design philosophy	**B**	A consideration of how the proposed design will operate on its own and in conjunction with existing components and facilities.
3	Model testing	**C**	A linear sequence of design steps to create the design for the project.
4	Prototype	**D**	A combination of reflection and projection, which positions the design relevant to the project as a whole.
5	Operational configuration	**E**	A mock-up of the design/ project, sometimes full scale, that enables the designers, users and other stakeholders to visualise the project while it is still in the design and developmental stage.
		F	A means of exploring the capabilities of a design and minimising the design risks without having to build the complete project or disrupt an operating facility.

3.5 Revision Exercise 2

1. The project design process is a linear sequence of design steps to create the design for the project. The steps within this process are listed below in the incorrect order. Rearrange these steps in the project design process into the correct order:
   - Phase Charter;
   - Corporate Vision Statement
   - Stakeholders;
   - Statement of Requirements;
   - Business Case;
   - Project Feasibility Study;
   - Project Design Process.

2. Briefly explain what each one of these steps in the project design process is.

3. The design of the project must not only consider the ease of building, but also the ease of operation. Explain the concept of operational efficiency within the context of an appropriate example of a project, according to the following:
   - Realise benefits;
   - Operational performance;
   - Ease of operation;
   - Skills required;
   - Ease of maintenance and repair.

Revision for Test

Activities:
- Revise Learning Units 1–5.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:
- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise 1

Questions:				**Model Solutions:**
Project design can be divided into five sub-divisions. The below table presents these five sub-divisions and descriptions of each one. Match each sub-division with its corresponding description.				
Sub-division		**Description**		
1	Project design process	**A**	A guide to help the project manager make design choices.	1 C
2	Project design philosophy	**B**	A consideration of how the proposed design will operate on its own and in conjunction with existing components and facilities.	2 A
3	Model testing	**C**	A linear sequence of design steps to create the design for the project.	3 D
4	Prototype	**D**	A combination of reflection and projection, which positions the design relevant to the project as a whole.	4 F
5	Operational configuration	**E**	A mock-up of the design/ project, sometimes full scale, that enables the designers, users and other stakeholders to visualise the project while it is still in the design and developmental stage.	5 B
		F	A means of exploring the capabilities of a design and minimising the design risks without having to build the complete project or disrupt an operating facility.	

Revision Exercise 2

Questions:	Model Solutions:
1. The project design process is a linear sequence of design steps to create the design for the project. The steps within this process are listed below in the incorrect order. Rearrange these steps in the project design process into the correct order.	• Phase Charter; • Corporate Vision Statement • Stakeholders; • Statement of Requirements; • Business Case; • Project Feasibility Study; • Project Design Process.
2. Briefly explain what each one of these steps in the project design process is.	Prescribed textbook p.104.
3. The design of the project must not only consider the ease of building, but also the ease of operation. Explain the concept of operational efficiency within the context of an appropriate example of a project, according to the following: • Realise benefits; • Operational performance; • Ease of operation; • Skills required; • Ease of maintenance and repair.	Prescribed textbook p.109.

Learning Unit 7: Project Execution Phase	
Material used for this Learning Unit: • Prescribed text p.110–119.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read p.110–119 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What is the project execution phase? ○ Where does project execution relate to each of the other phases within the project lifecycle? ○ What are the project build methods? ○ What is the project strategy as opposed to the project philosophy covered in Learning Unit 6?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

In groups of four to five, choose a project with which you are familiar. Think carefully about the project that your group chooses because you will use the same project in other tasks within this learning unit.

Visit the website below, which suggests how to plan a project execution. Apply the information presented on the website to your chosen project in a manner that demonstrates your understanding of the information.

For Dummies. 2014. *How to plan project execution.* [Online]. Available at:http://www.dummies.com/how-to/content/how-to-plan-project-execution.html [Accessed 17 May 2014].

3 Interactive Work Space

3.1 Izimvo Exchange 1

The project build-method outlines how to manufacture, construct or perform the project. On pp.112–115 of the prescribed textbook, there are a number of characteristics and features of a project build-method. Discuss any five of these with regards to your chosen project. The characteristics/ features chosen must be the most appropriate and relevant ones to your chosen project. Selecting the most appropriate ones will require you to consider all of them first.

Notes on Izimvo Exchange 1:
As the lecturer, listen to parts of each group's discussions and interject if necessary so as to guide these discussions appropriately and ensure that the students remain on the correct path.

3.2 Activity

Purpose:
To select an appropriate execution strategy for a specific project.

Task:
Burke (2013, p.116) explains that the project manager is responsible for developing the project execution strategy to determine who will execute the project. The project execution strategy "make or buy" decision determines if the work is performed by:

- In-house resources;
- External contractors (working within the company);
- Outsourced to an external company (locally or offshore) with the components made off site.

With regards to your chosen project, discuss the project execution strategy to be chosen for your project.

You are required to justify why you have chosen that strategy as opposed to other available strategies. You will be required to present the strategy to your classmates.

Activity:
Roam around the classroom to each group. Obtain a sense of how each group is progressing with the activity, interjecting where necessary so as to offer assistance with the development of each group's execution strategy. It is important that all groups remain on track to develop a strategy appropriate to their chosen project.

Commentary Related to Activity Design:
N/A

3.3 Revision Exercise

1. With reference to the building of a sports stadium, explain what project execution is.

2. Differentiate between using in-house resources and external contractors (working within the company).

3. Using the example of building a sports stadium, explain the problems of selecting an outsourcing strategy.

Revision for Test

Activities:

- Revise Learning Units 1–2.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:

- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise 1

Questions:	Model Solutions:
1. With reference to the building of a sports stadium, explain what project execution is.	Prescribed textbook p.111.
2. Differentiate between using in-house resources and external contractors (working within the company).	Prescribed textbook pp.116–117.
3. Using the example of building a sports stadium, explain the problems of selecting an outsourcing strategy	Prescribed textbook p.118.

Learning Unit 8: Project Commissioning and Handover Phase

Material used for this Learning Unit: • Prescribed text pp.120–131.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.120–131 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ What is project commissioning?
  ○ Where does the project commissioning and handover phase fit in relation to the project lifecycle?
  ○ What is meant by "receiving the deliverables"?
  ○ What does the process of verifying the scope of work entail?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Project commisioning and handover comprises a number of different activities. To assist you in obtaining clarity of each aspect of this phase, summarise the chapter through the use of a mind map. You are encouraged to use colours and pictures that will asisst you in memorising the chapter. Be sure to personalise the mind map. This contributes to your ability to differentiate between aspects of the phase.

Notes on Digital Engagement

Should students not be too familiar with how to develop a mind map, consider presenting one on the board prior to them attempting to summarise this chapter.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Study pp.129–131 on the Close-out Report. In groups of four to five discuss whether or not you feel it necessary to allocate valuable time and effort in compiling such a report. Once you have discussed the matter within your group, join up with another group and compare your findings. It is important that you are able to justify your collective feelings on the matter to your lecturer and peers.

3.2 Activity 1

Purpose:
To demonstrate an understanding of the activities involved in receiving the deliverables of a project.

Task:
As explained by Burke (2013, p.122) the receiving of deliverables formally transfers the deliverables and paperwork from the project execution phase to the project commissioning and handover phase. This process comprises of three aspects:

- Acceptance criteria;
- Receive the deliverables;
- Storage.

Choose a project with which you are familiar or select a fictitious project. Apply all three of these aspects to your chosen project.

Commentary Related to Activity Design:
N/A

3.3 Activity 2

Purpose:
To develop the students' knowledge of scope control and change management.

Task:
Burke (2013, p.123) also explains that the verification process confirms that the project's final scope of work and final list of deliverables were manufactured to the required specifications and standards.

This process involves the following aspects:

- Verifying the scope of work;
- Approving the design;
- Material acceptance;
- Work force;
- Equipment;
- Quality control;
- As-built.

Similarly to Activity 1 of this learning unit, apply all seven of these aspects to your chosen project.

Commentary Related to Activity Design:
N/A

3.4 Revision Exercise

1. Within the context of a specific project in which you have been involved, explain in detail what "project commissioning" is.

2. There are several steps involved in the project commissioning and handover phase. Illustrate these steps in their correct order using a flow diagram.

3. A critical aspect of the commissioning and handover phase is the verification of the scope of work.

    3.1 Briefly explain what this process entails.

    3.2 There are seven sub-divisions to verifying the scope of work. List and explain each of these within the context of a specific project with which you have been involved.

4. Similarly to Question 3.2 above, apply all of the steps associated with the termination of a project to the same project.

Revision for Test

Activities:
- Revise Learning Units 1–8.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:
- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise

Questions:	Module Solutions:
1. Within the context of a specific project in which you have been involved, explain in detail what 'project commissioning' is.	Prescribed textbook p.121.
2. There are several steps involved in the project commissioning and handover phase. Illustrate these steps in their correct order using a flow diagram.	• Received deliverables; • Verify the scope of work; • Test and commission the project; • Handover process; • Terminate the project; • Project closeout; • Closeout report questionnaire
3. A critical aspect of the commissioning and handover phase is the verification of the scope of work. 3.1 Briefly explain what this process entails. 3.2 There are seven sub-divisions to verifying the scope of work. List and explain each of these within the context of a specific project with which you have been involved.	Prescribed textbook p.123.
4. Similarly to Question 3.2 above, apply all of the steps associated with the termination of a project to the same project.	Prescribed textbook p.127.

Learning Unit 9: Project Plan	
Material used for this Learning Unit: • Prescribed text pp.140–149.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.140–149 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ What does mean to develop a project management plan?
  ○ What are the individual plans that constitute a project plan or baseline plan?
  ○ What does the term “Trade-off” mean within the context of a project plan?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

On an individual basis, conduct some basic research on the internet on “Project Plans”. Search through written articles as well as images via Google, so as to obtain an idea of different types of project plans available. The aim of this exercise is to familiarise yourself with different types of project plans and with what they comprise.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Having conducted research individually on what a project plan is and what it could look like, share your findings with your classmates in small groups of three to five students.

Notes on Izimvo Exchange 1:
Encourage students to share their findings by showing their peers evidence of their research on their portable devices or printouts of different types of project plans.

3.2 Izimvo Exchange 2

Class discussion:
Identify the benefits of having a project plan. Discuss the extent to which stakeholders would be considered while the project plan is being designed.

Notes on Izimvo Exchange 2:
Encourage all students to contribute to this discussion. Challenge the students' answers even if they are correct in their contributions. It is important that students are able to justify their contributions.

3.3 Activity 1

Purpose:
To demonstrate the benefit of developing a project plan.

Task:
In groups of four to five students, decide on a complicated task that needs to be completed. The task must have a time limit, a limit on the amount of money available to be spent as well as quality standards that need to be met. Most importantly, the task must have one main objective. Document this information so that the group can regularly refer to the criteria of the task. This information will be used in Activity 2.

Develop a basic plan to complete the task and meet the main objectives.

Activity 1:
Visit each group and interrogate the objectives and associated criteria of each task. It is important that this information is well thought through as it will need to be used by other groups following this activity.

Commentary Related to Activity Design:
N/A

3.4 Activity 2

Purpose:
To demonstrate the benefit of developing a project plan.

Task:
Each group is required to join up with a different group. Provide the new group with the guidelines of your task but do not provide them with the project plan that you have developed.

After five minutes of having considered the objective of your task and the accompanying criteria, the new group is now required to explain to you how they will complete the task within the criteria set out by you.

Following this presentation, compare what the manner in which the new group suggested that the objective be met with your more detailed project plan.

Activity 2:
Visit each group and obtain a sense of the challenges being experienced by the newly joined group in attempting to explain how each task should be completed without a well thought through project plan. Collate these challenges and discuss them with the class as a whole after Activity 2.

3.5 Revision Exercise

1. With reference to a specific project, explain what a project plan is.

2. Using the diagram on p.141 of the prescribed textbook, apply each section of the diagram to a specific project plan so that the diagram becomes customised to that particular plan.

3. Develop a mind map of the information presented on pp.144–146 under the heading. Link each of the individual plans accordingly. On the same mind map, explain each link between plans to demonstrate the interconnectedness of the project plan.

Revision for Test

Activities:

- Revise Learning Units 1–9.
- Advise students that the test will cover all of the above units.

You can use any/ all of these revision strategies:

- Work through self-study questions.
- Work through any stages/ sections that the students found difficult.
- Quiz students on the work – work in test conditions and give the students an oral test that you mark in class with them.

Solutions to Exercises

Revision Exercise

Questions:		Model Solutions:
1.	With reference to a specific project, explain what a project plan is.	Prescribed textbook p.141.
2.	Using the diagram on p.141 of the prescribed textbook, apply each section of the diagram to a specific project plan so that the diagram becomes customised to that particular plan;	Prescribed textbook p.141.
3.	Develop a mind map of the information presented on pp.144–146 under the heading. Link each of the individual plans accordingly. On the same mind map, explain each link between plans to demonstrate the interconnectedness of the project plan.	Prescribed textbook pp.144–146.

Learning Unit 10: Project Scope Management	
Material used for this Learning Unit: • Prescribed text pp.150–161.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read Sections 1–5 of this Learning Unit, and pp.150–161 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What is a scope management plan? ○ What comprises a scope management plan? ○ What is scope definition? ○ Why is a scope change control necessary?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

The YouTube video below provides a succinct tutorial on Preventing Scope Creep. Although the clip talks specifically to scope creep, the principles discussed in the clip are fundamental to this learning unit.

How to Prevent Project Management Scope Creep. 2012. [Video online]. Available at: http://www.youtube.com/watch?v=lKcJW1XqY4E [Accessed 17 May 2014].

It is important to read through Chapter 13 first before watching this video clip so that you are familiar with the terms used in the video.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Project scope management can be sub-divided into the following:

- Scope Management Plan;
- Identifying the stakeholders' Requirements;
- Develop Solutions;
- Scope Definition;
- Scope Change Control;
- Scope Validation.

Individually study the components of project scope management. Then as a class, discuss the importance of each of these and rank them into an order of importance.

Izimvo Exchange 1:
Students must study each of these six points on their own so that they are able to contribute towards the class discussion that follows. The ranking of these points may be context specific so encourage the students to consider numerous scenarios.

3.2 Izimvo Exchange 2

Scope definition is the structured process of identifying and describing the project's deliverables and all of the items of work necessary to make the deliverables. The scope of the project, also called the scope of work or the scope statement, are the terms used to define and describe all of the work that needs to be accomplished to make the project (Burke, 2013, p.154).

In groups of four to five members, discuss the challenges associated with definition of the scope of a project. Then, nominate a spokesperson to communicate the views of the group to the class.

3.3 Activity

Purpose:
To communicate the considerations associated with scope change control

Task:
As explained by Burke (2013, p.156) it is often necessary to make scope changes during a project due to better information becoming available and unanticipated occurrences. It is necessary to decide on a change management policy and the process to be used.

Activity:
Because the students are going to be teaching each other, it is imperative that they develop a thorough understanding of their respective section prior to conducting their presentations. As the lecturer, visit each group to ensure that the group members have grasped a sound understanding of their section of work and are able to communicate their understanding through the use of examples.

There are a number of considerations:

- Set up the change control system;
- Scope change initiation;
- Scope change assessment;
- Scope change implementation.

The class is divided into four groups. Each group is assigned one of the above four considerations. The role of each group is to study the section allocated to them and teach it to their peers.

Groups are encouraged to be as creative as possible and to use real examples to ensure relevance of their presentations.

Commentary Related to Activity Design:
N/A

3.4 Revision Exercise

1. Explain what the scope management plan is within the context of a specific project.

2. Choose a project with which you have been involved. Then, using Figure 13.1 that extends over pp.152–153, insert examples of each section into the table. For example, in the first block in Column 1 and Row 1, insert the stakeholders of the project as well as their vision and vales.

3. Through the use of an example, differentiate between Scope Validation and Scope Verification.

Solutions to Exercises

Revision Exercise

Questions:	Model Solutions:
1. Explain what the scope management plan is within the context of a specific project.	Prescribed textbook p.151.
2. Choose a project with which you have been involved. Then, using Figure 13.1 that extends over pp.152–153, insert examples of each section of the table into the table. For example, in the first block in Column 1 and Row 1, insert the stakeholders of the project as well as their vision and vales.	Prescribed textbook pp.152–153.
3. Through the use of an example, differentiate between Scope Validation and Scope Verification.	Prescribed textbook p.160.

Learning Unit 11: Work Breakdown Structure (WBS)	
Material used for this Learning Unit: • Prescribed text pp.162–173.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read pp.162–173 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What are the main components of a WBS? ○ What are the two methods of presenting the WBS? ○ What does an OBS represent? ○ What does the level 0 (zero) represent in the WBS?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

"Running a project without a WBS is like going to a strange land without a roadmap."
– J. Phillips

2 Recommended Digital Engagement and Activities

Access Microsoft Project 2010. Using the information provided below construct a simple WBS using the software program.

View the following video:

Format the Work Breakdown Structure – MS Project 2010 Tutorial. 2010. [Video online]. Available at: http://www.youtube.com/watch?v=GMYvSL8CV8E [Accessed 17 May 2014].

Project Outline: Remodelling a Smartphone
1. Research phase;
2. Design and engineering phase;
3. Testing phase;
4. Manufacturing phase;
5. Sales Phase.

1. **Research Phase**
   A. Prepare product development proposal:
      1. Conduct competitor analysis;
      2. Review sales reports;
      3. Conduct technology assessment;
   B. Develop focus group data;
   C. Conduct market surveys;
   D. Identify specification improvement.

2. **Design and engineering phase**
   A. Interface with marketing staff;
   B. Develop technical specification;
   C. Pilot test proposals.

For the remaining phases, design the WBS structure and input into Microsoft Project 2010.

3 Interactive Work Space

3.1 Izimvo Exchange 1

In a group of four discuss why most Project Managers consider a WBS superior to a simple list.

Notes on Izimvo Exchange 1

- A list can be cumbersome and does not allow you to clearly breakdown a large project into small enough parts;
- A list is usually created by one person whereas a WBS is created by the team;
- The process of creating a WBS allows the team to consider all aspects of the project thus improving the project plan;
- Being involved with creation of the WBS enables team members to become more familiar with the project;
- A WBS shows a complete hierarchy of the project. A list is simply a list.

3.2 Izimvo Exchange 2

Class discussion:

- Identify the benefits of using a WBS;
- Identify what you do with a WBS once it has been created.

Notes on Izimvo Exchange 2

- Helps prevent work slipping away unnoticed;
- Provides project team with an understanding of how the jigsaw fits together;
- Facilitates communication and cooperation throughout the project;
- Helps prevent changes;
- Provides a basis for estimating resources;
- Etc.

3.3 Activity 1

Purpose:
To practice preparing WBS.

Task:
You have been appointed project manager for a Red Hot Chilli Peppers concert. Outline how you would use the WBS to subdivide the event, considering the following:

- Methods of sub division;
- Develop standard temples for future use;
- Numbering system;
- Number of levels;
- What information would you roll up?

3.3.1 Commentary Related to Activity Design:
N/A

3.4 Activity 2

Purpose:
To develop skills in work breakdown construction.

Task:
Go to the assignment requirements for this module. Create a work breakdown structure for completion of the assignment. (Tip: View the assignment as a project.) Develop sub-steps where necessary. Keep the WBS to assist you when completing the assignment.

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise 1

1. List the basic steps to create a delivery based WBS structure.

2. What is the WBS dictionary? What does it contain?

3. Write T if the statement is true and F if the statement is false:

    3.1 Accomplishing schedules and status reporting is one of several WBS benefits.

    3.2 Level 2 of the WBS is used for project authority.

    3.3 The WBS is created by decomposing a project into smaller pieces of manageable work.

3.6 Revision Exercise 2

1. As a part of the project management plan that is the baseline of a project and includes the WBS; the project scope document and the WBS dictionary describes:
    1.1 Definitive schedule;
    1.2 CPM;
    1.3 Scope baseline;
    1.4 WBS.

2. The end result of a process that breaks down a project into small manageable pieces is the:
   2.1 CPM;
   2.2 OBS;
   2.3 WBS;
   2.4 PBP.

3. Outputs of the process of creating a WBS include:
   3.1 Statement of work;
   3.2 Project closure report;
   3.3 Specifications;
   3.4 A baseline of scope.

4. A project gets the following benefits from a WBS:
   4.1 Objectives can be linked to organisation resources;
   4.2 Costs and budget can be established;
   4.3 Schedules and status reporting can be accomplished;
   4.4 All of the above.

5. Which WBS level is used for work package?
   5.1 Level 1;
   5.2 Level 2;
   5.3 Level 3;
   5.4 Level 4.

6. You should bear the following in mind when creating a WBS:
   6.1 A good understanding of the project is needed;
   6.2 A good scope document should be written;
   6.3 Good documentation and input from all stakeholders is needed;
   6.4 All of the above are needed.

Solutions to Exercises

Revision Exercise 1

Questions:	Model Solutions:
1. List the basic steps to create a delivery based WBS structure.	Basic steps include: a) List the committed deliverables; b) Break down the committed deliverables into groups of activities; c) Breakdown each of these groups of activities into manageable activities; d) Identify the supplementary deliverables e) Add the supplementary deliverables as activities to the WBS; f) Evaluate all activities for optimum hierarchical planning; and g) Validate the WBS.
2. What is the WBS dictionary? What does it contain?	The WBS dictionary provides the description of activities that can easily be understood by the team members who are scheduled to carry out those activities. The WBS dictionary contains definitions of the scope or statement of works; definition of deliverables; a list of associated activities; a list of recognised milestone; identification of who is responsible for a specific WBS component; scheduled start and end date; required resources and estimated cost of the project.
3. Write T if the statement is true and F if the statement is false. 3.1 Accomplishing schedules and status reporting is one of several WBS benefits.	T
3.2 Level 2 of the WBS is used for project authority.	F
3.3 The WBS is created by decomposing a project into smaller pieces of manageable work.	T

Revision Exercise 2

Questions:	Model Solutions:
1. As a part of the project management plan that is the baseline of a project and includes the WBS; the project scope document and the WBS dictionary describes: 1.1 Definitive schedule; 1.2 CPM; 1.3 Scope baseline; 1.4 WBS.	1.3
2. The end result of a process that breaks down a project into small manageable pieces is the: 2.1 CPM; 2.2 OBS; 2.3 WBS; 2.4 PBP.	2.3
3. Outputs of the process of creating a WBS include: 3.1 Statement of work; 3.2 Project closure report; 3.3 Specifications; 3.4 A baseline of scope.	3.4
4. A project gets the following benefits from a WBS: 4.1 Objectives can be linked to organisation resources; 4.2 Costs and budget can be established; 4.3 Schedules and status reporting can be accomplished; 4.4 All of the above.	4.4
5. Which WBS level is used for work package? 5.1 Level 1; 5.2 Level 2; 5.3 Level 3; 5.4 Level 4.	5.4
6. You should bear the following in mind when creating a WBS: 6.1 A good understanding of the project is needed; 6.2 A good scope document should be written; 6.3 Good documentation and input from all stakeholders is needed; 6.4 All of the above are needed.	6.4

Learning Unit 12: Project Time Management	
Material used for this Learning Unit: • Prescribed text pp.174–183.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.174–183 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ What is an activity in the context of project management?
  ○ What are the characteristics of an activity?
  ○ What is the relationship between the Work Breakdown Structure (WBS) and the activities of a project?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Visit the website provided below. A list of six steps of the time management process is available. Study these steps and then create a flow chart of the steps to complement the information presented in Chapter 15 in your textbook. Each step in the flow chart is to be coloured a different colour.

Once the flow chart has been created, apply the information in the flow chart to a real life task that required detailed time management such as that required in project management. Colour code the heading of each section of the example the same colour as the relevant section of the flowchart.

Tutorialspoint. 2014. *Project time management.* [Online]. Available at: http://www.tutorialspoint.com/management_concepts/project_time_management.htm [Accessed 17 May 2014].

Notes on Digital Engagement:
Although this may seem like a simple task at first, the application to a real example becomes more challenging as does the application of each section of the flowchart to the selected example.

3 Interactive Work Space

3.1 Izimvo Exchange

As explained by Burke (2013, p.182) the time parameter is interlinked with most, if not all, of the knowledge areas. In groups of four to five, discuss the impact of a reduction in time on a project with which all of the members of your group are familiar. Be sure to consider all of the items listed in the table on p.182 of the prescribed textbook.

3.2 Activity 1

Purpose:
To develop a set of activities based on a Work Breakdown Structure (WBS).

Task:
Individually, think of a small project that one is able to complete within two days. Develop a WBS for this project. Then taking into consideration the characteristics of activities, assign a series of activities to the WBS.

Commentary Related to Activity Design:
N/A

3.3 Activity 2

Purpose:
To estimate a project's activities' durations.

Task:
Study Section 5 of Chapter 15 on estimating an activity's duration. Estimate the duration of each of the activities that you have detailed in Activity 1 above.

Commentary Related to Activity Design:
N/A

3.4 Revision Exercise

Match the following terms with their descriptions:

Term		Description	
1	Gantt Chart	**A**	A technique that integrates cost and time, or man-hours and time, to enable the project manager to plan and control a project's progress in comparable units.
2	Earned Value	**B**	Used to shorten the project's duration.
3	Resources	**C**	A presentation of the project's schedule information in an easy to understand bar chart format.
4	CPM	**D**	The function that interlinks with the project's schedule to produce a schedule that outlines when the procured items are required.
5	Crashing	**E**	Calculates the start and finish (end) dates of the activities and their float.
		F	Interlinks with the project's schedule to produce the resource histogram and schedule outlining when resources are required.

Solutions to Exercises

Revision Exercise

Questions:				**Model Solutions:**
Term		**Description**		
1	Gantt Chart	**A**	A technique that integrates cost and time, or man-hours and time, to enable the project manager to plan and control a project's progress in comparable units.	1 – C
2	Earned Value	**B**	Used to shorten the project's duration.	2 – A
3	Resources	**C**	A presentation of the project's schedule information in an easy to understand bar chart format.	3 – F
4	CPM	**D**	The function that interlinks with the project's schedule to produce a schedule that outlines when the procured items are required.	4 – E
5	Crashing	**E**	Calculates the start and finish (end) dates of the activities and their float.	5 – B
		F	Interlinks with the project's schedule to produce the resource histogram and schedule outlining when resources are required.	

Learning Unit 13: Critical Path Method (CPM)	
Material used for this Learning Unit: • Prescribed text p.184–197.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read p.184–197 in the textbook. • As you read these sections, see if you can find the answers to the following questions: ○ What is another name for network diagram? ○ What does it mean to for activities to be in series? ○ When do you carry out a forward pass? ○ Does EF= ES + Duration – 1?	

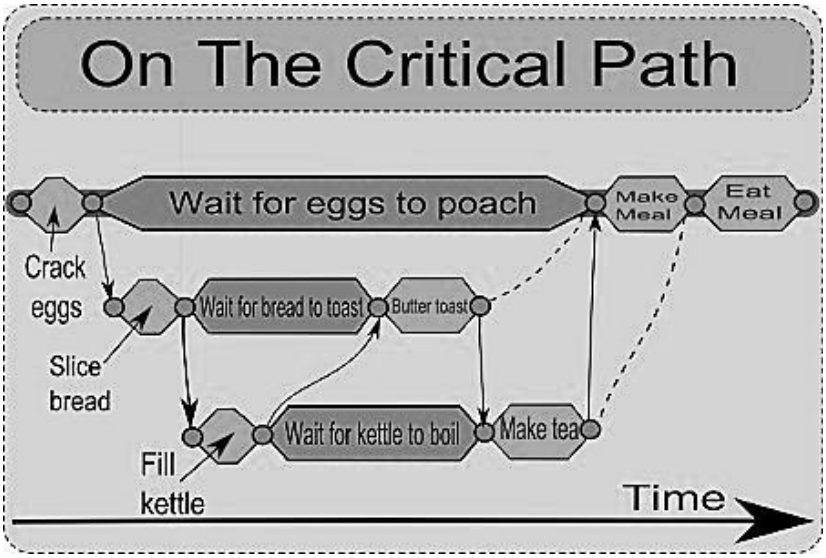


Diagram 1 On the critical path

"A project without a critical path is like a ship without a rudder."
– D. Meyer, Illinois Construction Law

1 Recommended Digital Engagement and Activities

Using the network you developed in Learning Unit 9, use MSProject to produce a simple network diagram showing the links between the various project activities.

View the following video:
CPM and PERT Method. 2011. [Video online]. Available at: http://www.youtube.com/watch?v=CzKmLvvuYBU [Accessed 17 May 2014].

2 Interactive Work Space

2.1 Izimvo Exchange 1

Work in groups of four. Research the history of the Critical Path Method.

Izimvo Exchange 1:
See website below for a summary:
Kielmas, M. *s.a. History of the critical path method.* [Online]. Available at: http://smallbusiness.chron.com/history-critical-path-method-55917.html [Accessed 17 May 2014].

2.2 Izimvo Exchange 2

In groups of four carry out the following tasks for each chosen option:

Options:
- Baking an iced birthday cake;
- Cleaning, waxing and valeting a car;
- Preparing a formal celebration dinner;
- Learning to drive a motor vehicle;
- Doing a Varsity College project management assignment;
- Re-decorating a kitchen;

Select two of the options given above:

1. Draw a flow chart showing all of the activities required to achieve the end result.

2. Put estimated times to each activity identified.

3. Draw up an activity logic table.

4. Draw a network diagram.

5. Calculate the critical path for each activity.

Activity 1:
Each group is to develop a question and memo. Pass the problems to different groups and get all of the groups to solve each other's networks. Ideally get a copy of all of the problems and memos and copy to the students for revision purposes.

2.3 Activity 1

Purpose:
Practice the Critical Path Method by developing a critical path method problem.

Task:
In pairs, develop a network of any size that has at least one of each of the following features:
1.1 Merge activity;
1.2 Burst activity;
1.3 Hammock activity;

1.4 Critical path;
1.5 Serial activity;
1.6 Concurrent activity;
1.7 Float.

Draw the activity logic table and a network diagram. Mark all of the above features on your network diagram. Assign durations to your tasks and calculate the critical path. Complete forward and backward passes. When your network and associated works are complete, draw the activity logic table on a separate sheet of paper. Hand into the lecturer who will pass the problems around the class for other groups to attempt your critical path problem.

Commentary Related to Activity Design:
Keep all of the network problems and solutions to help you with your revision.

2.4 Activity 2

Purpose:
Ensure that students are fully conversant with the terminology associated with the Critical Path Method.

Task:
Define the following terms:

- Path;
- Activity;
- Early start;
- Early finish;
- Late start;
- Late finish;
- Forward pass;
- Backward pass;
- Node;
- Float;
- Critical path.

2.5 Revision Exercise 1

1. What does a network diagram illustrate and why are they important in project management?

2. Construct a network using the information in the table below and identify the critical path.

When drawing network diagrams make sure you draw big boxes to contain all of the information you will calculate.

Activity	Time	Predecessor
A	4	
B	6	A
C	9	A
D	11	B
E	16	B,C
F	4	D
G	8	E,F
H	7	G

3. Carry out a forward and backward pass on the network drawn in Question 2.

4. How do you think the critical path duration could be reduced? Identify at least five possibilities and comment on which you believe would be the most effective and which would be the most difficult to achieve.

5. Write T if the statement is true, F if the statement is false:

    5.1 Preceding activities means those activities that must occur before other activities can be completed.

    5.2 When it is necessary to undo some work that has been completed incorrectly, we carry out a backward pass.

    5.3 A merge activity has two or more immediate predecessors.

    5.4 Slack is always measured in the same way as float.

2.6 *Revision Exercise 2*

Choose the one alternative that best completes the statement or answers the question.

1. What can be located by doing a backward pass through a network?
    1.1 Burst activities;
    1.2 Merge activities;
    1.3 Critical path;
    1.4 Float.

2. The least amount of float is found:
   2.1 In a resource activity;
   2.2 On the critical path;
   2.3 After a merge activity;
   2.4 After a burst activity.

3. An activity with two or more immediate predecessors is:
   3.1 A float activity;
   3.2 A merge activity;
   3.3 A burst activity;
   3.4 A node.

4. The amount of time an activity can be delayed from its early start without delaying the finish of the project is the:
   4.1 Late start;
   4.2 Late finish;
   4.3 Float;
   4.4 Critical Path.

5. Write the word or phrase that best completes each statement or answers the question.

   5.1 If activities can be worked on simultaneously they are called _____ activities.

   5.2 There is no float on the project _____.

   5.3 The longest route through a network is the _____.

   5.4 An activity that has two or more immediate predecessors is called a _____.

Solutions to Exercises

Revision Exercise 1

<table>
<tr><th colspan="2">Questions:</th><th>Model Solutions:</th></tr>
<tr><td>1.</td><td>What does a network diagram illustrate and why are they important in project management?</td><td>A network diagram is a schematic display of a project's work packages. It also shows the logical relationships and interdependencies. Due to this it helps communication flows and assists with the scheduling of resources for a project. It also identifies the critical activities. All of this information helps the project to keep the project on schedule.</td></tr>
<tr><td>2.</td><td>Construct a network using the information in the table below and identify the critical path.</td><td>Critical path ACEGH.</td></tr>
<tr><td>3.</td><td>Carry out a forward and backward pass on the network drawn in Question 2.</td><td>
<table>
<tr><td>Task</td><td>ES</td><td>EF</td><td>LS</td><td>LF</td></tr>
<tr><td>A</td><td>0</td><td>4</td><td>0</td><td>4</td></tr>
<tr><td>B</td><td>4</td><td>10</td><td>7</td><td>13</td></tr>
<tr><td>C</td><td>4</td><td>13</td><td>4</td><td>13</td></tr>
<tr><td>D</td><td>10</td><td>21</td><td>14</td><td>25</td></tr>
<tr><td>E</td><td>13</td><td>29</td><td>13</td><td>29</td></tr>
<tr><td>F</td><td>21</td><td>25</td><td>25</td><td>29</td></tr>
<tr><td>G</td><td>29</td><td>37</td><td>29</td><td>37</td></tr>
<tr><td>H</td><td>37</td><td>44</td><td>37</td><td>44</td></tr>
</table>
</td></tr>
<tr><td>4.</td><td>How do you think the critical path duration could be reduced? Identify at least five possibilities and comment on which you believe would be the most effective and which would be the most difficult to achieve.</td><td>1. Eliminate tasks on critical path.
2. Re-plan serial tasks to be in parallel.
3. Overlap sequential tasks.
4. Shorten duration on critical path tasks.
5. Shorten early tasks.
6. Shorten longest tasks.
7. Shorten easiest tasks.
8. Shorten tasks that cost the least to speed up.</td></tr>
<tr><td>5.1</td><td>Preceding activities means those activities that must occur before other activities can be completed.</td><td>T</td></tr>
<tr><td>5.2</td><td>When it is necessary to undo some work that has been completed incorrectly we carry out a backward pass.</td><td>F</td></tr>
</table>

Questions:	Model Solutions:
5.3 A merge activity has two or more immediate predecessors.	T
5.4 Slack is always measured in the same way as float.	T

Revision Exercise 2

Questions:	Model Solutions:
Choose the one alternative that best completes the statement or answers the question. 1. What can be located by doing a backward pass through a network? 1.1 Burst activities; 1.2 Merge activities; 1.3 Critical path; 1.4 Float.	1.1
2. The least amount of float is found: 2.1 In a resource activity; 2.2 On the critical path; 2.3 After a merge activity; 2.4 After a burst activity.	2.2
3. An activity with two or more immediate predecessors is: 3.1 A float activity; 3.2 A merge activity; 3.3 A burst activity; 3.4 A node.	3.2
4. The amount of time an activity can be delayed from its early start without delaying the finish of the project is the: 4.1 Late start; 4.2 Late finish; 4.3 Float; 4.4 Critical Path.	4.3
5. Write the word or phrase that best completes each statement or answers the question. 5.1 If activities can be worked on simultaneously they are called _____ activities.	Concurrent.
5.2 There is no float on the project _____.	Critical path.
5.3 The longest route through a network is the _____.	Critical path.
5.4 An activity that has two or more immediate predecessors is called a _____.	Merge.

Learning Unit 14: Gantt Charts	
Material used for this Learning Unit: • Prescribed text pp.198–209	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.198–209 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ Who invented Gantt charts?
  ○ What is a hammock activity?
  ○ What is another name for a rolling horizon Gantt chart?
• Who developed line of balance?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Look at MSProject. Can you produce a simple Gantt chart? Try and include links, milestones, etc.

View the following video:

3 Interactive Work Space

3.1 Izimvo Exchange 1

In groups of four, discuss and prepare answers to the following questions:

1. Do you agree that the advantage of Gantt charts lies in their connection to the project schedule baseline? Explain.

2. What circumstances can you think of where you might want to crash a project?

3. What is the advantage to using Gantt charts over PERT diagrams?

3.2 Izimvo Exchange 2

Go to the following website:

Microsoft Office. 21014. *Create a Gannt chart in Excel.* [Online]. Available at: http://office.microsoft.com/en-za/excel-help/create-a-gantt-chart-in-excel-HA001034605.aspx [Accessed 17 May 2014].

Using the activity data table, Table 17.1 on p.200 in the prescribed textbook, create a Gantt chart using Microsoft Excel.

3.3 Activity 1

Purpose:
To ensure students understand how to develop a Gantt chart from basic project information.

For Activity 1 consult pp.198–209 in the textbook.

Task:
You have been appointed Project Manager of a Royal Geographical Society safari in search of the source of the River Nile. You are required to present a Gantt chart which includes the following:

- Activities sorted and ordered to give the best presentation;
- Hammocks;
- Milestones and events;
- Revised Gantt chart;
- Rolling horizon Gantt chart.

Present your work in a formal report format, professionally laid out.

Commentary Related to Activity Design:
Remember presentation is important. No spelling or grammar mistakes. Prepare the report as if you were presenting it to your boss at work.

3.4 Activity 2

Purpose:
To consolidate students' knowledge about Gantt charts and their uses.

Task:
View the following video and take summary notes:

What is a Gannt Chart? 2011. [Video online]. Available at: http://www.youtube.com/watch?v=ANis9xuA8EA [Accessed 17 May 2014].

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise 1

1. What is a Gantt chart, what information does it contain and what are the benefits in using one?

2. What is project crashing? Give at least three reasons why it may be important to do.

3. Use the activity chart below to create a baseline Gantt chart for a project. Activity lengths are given in days.

Activity	Duration	Predecessor
A	6	-
B	3	A
C	7	A
D	5	B
E	10	C
F	8	D,E
G	6	F
H	4	G
I	10	G
J	5	H

4. Write the word or phrase that best completes each statement or answers the question.

   4.1 _____ is measured on the horizontal axis of a Gantt chart.

   4.2 The name given to the process of accelerating a project is _____.

   4.3 Projects can be accelerated in three ways. These are _____, _____ and _____.

3.6 Revision Exercise 2

1. You have created an activity network and discovered that your project has two critical paths. Is this possible or are your calculations incorrect? Explain your response.

2. Is it normal to show activity float on a Gantt chart and, if so, how is it depicted?

3. What is the principle difference between an event and an activity? Give two alternative names for an event.

4. What is the purpose of a revised Gantt chart? Name and explain the two different ways of drawing the Gantt chart.

5. Give an alternative name for the rolling horizon Gantt chart and explain its purpose.

6. What is the purpose of a trend Gantt chart? Draw a sketch of a trend chart showing the following:
   6.1 Activity 100 progressing as planned;
   6.2 Activity 200 progress behind and steady;
   6.3 Activity 300 progress behind and getting worse;
   6.4 Activity 400 progress behind but catching up;
   6.5 Activity 500 progress ahead and steady.

Solutions to Exercises

Revision Exercise 1

Questions:	Model Solutions:
1. What is a Gantt chart, what information does it contain and what are the benefits in using one?	It is a tool for creating a project network. It establishes a time based network which links activities to the project schedule baseline. They can also be used as a project tracking tool to enable the management team to assess the difference between planned and actual activity. Benefits include: • They are easy to read and understand; • They identify the project network linked to the project schedule baseline; • They allow for project updating and project control; • They are useful in identifying resource requirements and finally they are easy to create.
2. What is project crashing? Give at least three reasons why it may be important to do.	Project accelerating is also called crashing. It is used to aid resource commitment. The more resources the PM is able to commit, the earlier the project can finish. When crashing is important: • The initial schedule was too optimistic; • Market needs change and the project needs to finish earlier; • The project is significantly behind schedule; • The contract means that it is beneficial to complete early (bonuses).

<table>
<tr><th>Questions:</th><th>Model Solutions:</th></tr>
<tr><td>3. Use the activity chart below to create a baseline Gantt chart for a project. Activity lengths are given in days.
<table>
<tr><th>Activity</th><th>Duration</th><th>Predecessor</th></tr>
<tr><td>A</td><td>6</td><td>-</td></tr>
<tr><td>B</td><td>3</td><td>A</td></tr>
<tr><td>C</td><td>7</td><td>A</td></tr>
<tr><td>D</td><td>5</td><td>B</td></tr>
<tr><td>E</td><td>10</td><td>C</td></tr>
<tr><td>F</td><td>8</td><td>D,E</td></tr>
<tr><td>G</td><td>6</td><td>F</td></tr>
<tr><td>H</td><td>4</td><td>G</td></tr>
<tr><td>I</td><td>10</td><td>G</td></tr>
<tr><td>J</td><td>5</td><td>H</td></tr>
</table></td><td></td></tr>
<tr><td>4. Write the word or phrase that best completes each statement or answers the question.
4.1 _____ is measured on the horizontal axis of a Gantt chart.</td><td>Time.</td></tr>
<tr><td>4.2 The name given to the process of accelerating a project is _____.</td><td>Crashing.</td></tr>
<tr><td>4.3 Projects can be accelerated in three ways. These are _____, _____ and _____.</td><td>Productivity, types, quantity.</td></tr>
</table>

Revision Exercise 2

Questions:	Model Solutions:
1. You have created an activity network and discovered that your project has two critical paths. Is this possible or are your calculations incorrect? Explain your response.	Having more than one critical path is possible; however, the more activities that exist on the critical path(s), the greater the risk to the project's schedule because delays in any critical activity will delay the completion of the project.
2. Is it normal to show activity float on a Gantt chart and, if so, how is it depicted?	Yes, the accepted presentation is to show the float at the end of the activity from EF to LF and show as a dotted line with a symbol at the end, usually a diamond or upturned triangle.

Questions:	Model Solutions:
3. What is the principle difference between an event and an activity? Give two alternative names for an event.	An event has zero duration; it is a point in time. An event can be called a key-date or milestone.
4. What is the purpose of a revised Gantt chart? Name and explain the two different ways of drawing the Gantt chart.	Prescribed textbook p.172.
5. Give an alternative name for the rolling horizon Gantt chart and explain its purpose.	Rolling wave Gantt chart. A simplified Gantt chart that focuses on a short period ahead.
6. What is the purpose of a trend Gantt chart? Draw a sketch of a trend chart showing the following: 6.1 Activity 100 progressing as planned; 6.2 Activity 200 progress behind and steady; 6.3 Activity 300 progress behind and getting worse; 6.4 Activity 400 progress behind but catching up; 6.5 1.5 Activity 500 progress ahead and steady.	Prescribed textbook p.174.

Learning Unit 15: Project Procurement Management	
Material used for this Learning Unit: • Prescribed text pp.210–221.	*My Notes on this Learning Unit:*
How to prepare for this Learning Unit: • Before the first class, be sure that you read pp.210-221 in the textbook. • As you read these sections, see if you can find the answers to the following questions: o What is the PMBOK definition of procurement management? o What is the make or buy decision? o If you expedite an order are you speeding it up or slowing it down? o What does order lead time mean?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Notes on Digital Engagement:
It is advisable to set up a subject blog at the start of the course. Encourage the students to post questions, help each other and discuss items relevant to the subject.

Your lecturer has set up a "Project Management" blog and will inform you where it can be found on the internet. Respond to the two questions detailed below on the blog – you may also respond/ challenge responses given by other members of the class.

1. In general what types of project contract exist? As a project manager which would be your favourite type of contract to manage and why?

2. Assume you are assigned to manage an international project. What challenges and difficulties do you think this would give you in terms of procurement?

3 Interactive Work Space

3.1 Izimvo Exchange 1

In a group of four, discuss how you would go about setting up a project procurement system in a project environment. Draw a flow chart of the processes (including checks and balances) that you would put in place.

3.2 Izimvo Exchange 2

Tshwane Municipality Tenders; access the link below:

City of Tshwane. 2010. *Tenders.* [Online]. Available at: http://www.tshwane.gov.za/Business/Pages/New-Tenders.aspx [Accessed 17 May 2014].

Look at some of the tender documentation under “additional important information”. Scroll down and look at some of the current tenders. Discuss and answer the following:

1. Do you think there will be a difference in purchasing items for Government run/ funded projects than for purchasing items for completely private projects?

2. What are some of the unique features of tendering/ procuring for Government projects?

3.3 Activity 1

Purpose:
To identify some of the risk factors associated with procurement.

Task:
Corruption is an unfortunate factor that has to be considered in the world today. How would you, as the Project Manager of a Government funded project, go about ensuring that there are no acts of corruption associated with your project?

Commentary Related to Activity Design:
Think widely about all the possible ways corruption can appear in a project. Then devise control methods to ensure that they do not occur.

3.4 Activity 2

Purpose:
To look at the implications of expediting a project.

Task:
Work in groups of four. Appoint members of your group to the following positions:

- Project Manager;
- Finance Manager;
- HR Manager;
- Marketing/ Client Liaison Manager.

You are working on a large Government funded hospital project in Gauteng. The local district hospital has just been condemned and two-thirds of the wards have been closed down. This means that the hospital project that you are working on must be completed two months earlier than originally planned. Discuss the actions you as a team will take and put together a detailed action plan to expedite your project. Each group member should take the viewpoint of their appointed position. In addition to the action plan, keep full and detailed minutes of the meeting you are holding.

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise 1

1. Complete the table below to show the following:
   1.1 Order by date;
   1.2 Led time;
   1.3 JIT.

2. For all activities:

WBS	PO	Lead Time	JIT	Early Start	Order by Date	Delivery Date	Variance
100	PO1	3	2	9		8	
200	PO2	4	0	9		8	
300	PO3	3	3	9		8	
400	PO4	4	2	9		8	
500	PO5	4	4	9	1	9	
600	PO6	2	2	9	1	5	

3. What six factors do you need to consider when you make a procurement plan?

4. What is the “buy” decision based on?

5. What is the “make” decision based on?

6. What is a “vendor list” and what does “pre-qualification” mean?

7. You are asked to “adjudicate” a tender for the provision of timber products for your project. What does this mean and how would you go about it?

3.6 Revision Exercise 2

1. Outline a typical procurement schedule for a wedding and give examples of how long lead times affect your JIT scheduling.

2. As the power of the internet grows, so B2B procurement becomes more common. Outline how B2B could be used on a large infrastructure project.

3. Identify at least six questions an expeditor should be asking if he/ she is going to assist the Project Manager to keep the project on schedule.

4. What is the purpose of the procurement control document?

5. What does JIT stand for? Explain, using examples, exactly what it means and its purpose in project management.

Solutions to Exercises

Revision Exercise 1

<table>
<tr><th>Questions:</th><th>Model Solutions:</th></tr>
<tr><td>1. Complete the table.</td><td>
<table>
<tr><th>WBS</th><th>PO</th><th>Lead Time</th><th>JIT</th><th>Early Start</th><th>Order by Date</th><th>Delivery Date</th><th>Variance</th></tr>
<tr><td>100</td><td>PO1</td><td>3</td><td>2</td><td>9</td><td>3</td><td>8</td><td>0</td></tr>
<tr><td>200</td><td>PO2</td><td>4</td><td>0</td><td>9</td><td>4</td><td>8</td><td>0</td></tr>
<tr><td>300</td><td>PO3</td><td>3</td><td>3</td><td>9</td><td>2</td><td>8</td><td>0</td></tr>
<tr><td>400</td><td>PO4</td><td>4</td><td>2</td><td>9</td><td>2</td><td>8</td><td>0</td></tr>
<tr><td>500</td><td>PO5</td><td>4</td><td>4</td><td>9</td><td>1</td><td>9</td><td>-1</td></tr>
<tr><td>600</td><td>PO6</td><td>2</td><td>2</td><td>9</td><td>1</td><td>5</td><td>3</td></tr>
</table>
</td></tr>
<tr><td>2. What six factors do you need to consider when you make a procurement plan?</td><td>• What to procure?
• How much to procure?
• When it is required?
• When to procure?
• Where to procure?
• How to procure (type of contract)?</td></tr>
<tr><td>3. What is the “buy” decision based on?</td><td>When the organisation’s resources lack the expertise and machinery, or when the resources are overloaded, or when an outside sub-contractor makes an offer the company cannot refuse.</td></tr>
<tr><td>4. What is the “make” decision based on?</td><td>When the company resources, expertise and machinery are available and underutilised, and the internal costs are less than when using outside contractors or outsourcing.</td></tr>
<tr><td>5. What is a “vendor list” and what does” pre-qualification” mean?</td><td>All potential suppliers need to be identified and pre-qualified according to criteria set out in the project quality plan. The project manager needs to be satisfied that the suppliers have the production and quality management systems to deliver the product to the required specification, quality standards and schedule. The reputation and financial stability of the company should also be considered. Once the supplier meets all these requirements they are put onto the vendor list.</td></tr>
</table>

Questions:	Model Solutions:
6. You are asked to "adjudicate" a tender for the provision of timber products for your project. What does this mean and how would you go about it.	The tender adjudication process scrutinises the quotations (tenders) by compiling a technical and commercial bid tabulation of the quotations. This ensures the buyer is comparing "like with like" and meeting the selection criteria established by the company. The adjudication process should consider the suppliers suggestions and should always allow room for negotiation. The adjudication process should also identify the risks associated with the supply of good or service and document the risk.

Revision Exercise 2

Questions:	Model Solutions:
1. Outline a typical procurement schedule for a wedding and give examples of how long lead times affect your JIT scheduling.	Each student's answer will be different.
2. As the power of the internet grows, so B2B procurement becomes more common. Outline how B2B could be used on a large infrastructure project.	Prescribed textbook p.188.
3. Identify at least six questions an expeditor should be asking if he/ she is going to assist the Project Manager to keep the project on schedule.	Prescribed textbook p.186.
4. What is the purpose of the procurement control document?	To gather all the information together and summarise all the related functions. Prescribed textbook Figure 12.5 p.187.
5. What does JIT stand for? Explain, using examples, exactly what it means and its purpose in project management.	Just-in-Time. For explanation see prescribed textbook p.188.

Learning Unit 16: Project Resource Management	
Material used for this Learning Unit: • Prescribed text pp.222–231.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.222–231 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ What is the definition of a resource?
  ○ Is the resource estimate linked to the scope of work and BOM?
  ○ What information do you require to develop a resource histogram?
  ○ Identify five different ways of increasing resources?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

Notes on Digital Engagement:
It is advisable to set up a subject blog at the start of the course. Encourage the students to post questions, help each other and discuss items relevant to the subject.

2 Recommended Digital Engagement and Activities

Search the web for examples of projects that have suffered from the following:

- Resource constraints;
- Time constraints.

Post your examples to the subject blog.

Notes on Digital Engagement:
Encourage students by suggesting a competition to see who can post the most number of projects. All responses must include the project name and how/ why it was constrained.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Watch the video detailed below on the Boston Big Dig:

Watch Documentary. 2014. *MegaStructures S02E22: Boston's Big Dig.* [Video online]. Available at: http://watchdocumentary.org/watch/megastructures-s02e22-bostons-big-dig-video_ece14467f.html [Accessed 17 May 2014].

Do some additional research and answer the following question:

Describe the problems that the project had. How has resource management played a role in the severe delays and cost overruns associated with the project?

Notes on Izimvo Exchange 1:
Show the video to the whole class. Then ask the students to do some additional research. When that is completed encourage class discussion to answer the questions.

3.2 Izimvo Exchange 2

You are appointed project manager for a construction project to build a road and rail bridge over a river valley. Identify the resource constraints that will make this project challenging for you.

3.3 Activity 1

Purpose:
To practice resource smoothing.

Task:
Draw the resource histogram and smooth the activities to give the best solution to the resource problem shown in the Gantt chart below. Assume that all activities can move within the float.

	1	2	3	4	5	6	7	8	9	10
100	7									
200		4	4	****	****	****	****	****		
300		4	4	****	****	****	****			
400		3	3	3						
500					3	3				
600				4	4	****	****	****		
700				4	4	****	****	****	****	
800							3	3	3	
900										7
TOTAL	**7**	**11**	**11**	**11**	**11**	**3**	**3**	**3**	**3**	**7**

= float

Commentary Related to Activity Design:
N/A

3.4 Activity 2

Purpose:
To look further at resource overloading and identify possible solutions to this management problem.

Task:
In a group of four, identify what options you have to address resource overloads on a project. Identify the advantages and disadvantage of each option.

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise 1

1. Draw the resource histogram and smooth the activities to give the best solution to the resource problem shown in the Gantt chart below. Assume that all activities can move within the float.

	1	2	3	4	5	6	7	8	9	10
100	5									
200		5	5	5	5	****	****	****	****	
300		4	4	****	****	****	****			
400		3	3	3	3	****	****	****	****	
500						5	5			
600						3	3			
700								3	3	
800										5
900										3
TOTAL	**5**	**12**	**12**	**8**	**8**	**8**	**8**	**3**	**3**	**8**

*= float

2. Once a resource histogram has been completed, the Project Manager can identify the resource overloads and underloads. Identify and explain five different ways in which these overloads can be addressed.

3. Resource smoothing is the process of moving activities to improve the resource loading profile. The first step is to select the resource to be smoothed as you cannot smooth more than one resource at a time. What factors should you consider to decide which resource to smooth?

4. Identify seven ways in which the project manager can increase resources.

5. When resources are underloaded there are a number of options for reducing the available resources. Identify six of these options.

3.6 Revision Exercise 2

1. Describe resource smoothing – its objectives and the basic five-step technique to perform it.

2. Use the activity precedence table below to create a resource histogram. Activity lengths are given in days and an 8 hour day is assumed.

Activity	Time	Predecessor
A	2	-
B	3	A
C	6	B
D	5	A
E	3	C
F	2	D
G	2	E,F

3. Use the project described in the table below to determine the total resources required for this project if a worker is expected to devote 4 hours per day to this project:

Activity	Duration (days)	Predecessor
A	5	-
B	4	A
C	5	A
D	6	B
E	6	C,D
F	6	E

4. Use the project described in the table below to determine the total resources required for activity D if a worker is expected to devote 4 hours per day to this project:

Activity	Duration (days)	Predecessor
A	5	-
B	4	A
C	5	A
D	6	B
E	6	C,D
F	6	E

5. Use the information in the table below to determine the total resources required for activity G if a worker is expected to devote 4 hours per day, five days per week to this project:

Activity	Predecessor	Hrs/ day	Days
A	-	4	6
B	A	4	11
C	A	5	5
D	B	4	6
E	B	4	6
F	B	6	3
G	C,D	8	11
H	E,F	8	8
J	G,H	3	10
K	J	6	4

Solutions to Exercises

Activity 1

Questions:

Purpose:

To practice resource smoothing.

Task:

Draw the resource histogram and smooth the activities to give the best solution to the resource problem shown in the Gantt chart below. Assume that all activities can move within the float.

	1	2	3	4	5	6	7	8	9	10
100	7									
200		4	4	****	****	****	****	****		
300		4	4	****	****	****	****			
400		3	3	3						
500					3	3				
600				4	4	****	****	****		
700				4	4	****	****	****	****	
800							3	3	3	
900										7
TOTAL	**7**	**11**	**11**	**11**	**11**	**3**	**3**	**3**	**3**	**7**

*= float

Solution:

	1	2	3	4	5	6	7	8	9	10
100	7									
200		4	4	****	****	****	****	****		
300		****	****	4	4	****	****			
400		3	3	3						
500					3	3				
600				****	****	4	4	****		
700				****	****	****	****	4	4	
800							3	3	3	
900										7
TOTAL	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**

3.7 Revision Exercise 1

Questions:

1. Draw the resource histogram and smooth the activities to give the best solution to the resource problem shown in the Gantt chart below. Assume that all activities can move within the float.

	1	2	3	4	5	6	7	8	9	10
100	5									
200		5	5	5	5	****	****	****	****	
300		4	4	****	****	****	****			
400		3	3	3	3	****	****	****	****	
500						5	5			
600						3	3			
700								3	3	
800										5
900										3
TOTAL	**5**	**12**	**12**	**8**	**8**	**8**	**8**	**3**	**3**	**8**

Solution:

	1	2	3	4	5	6	7	8	9	10
100	5									
200				5	5	****	****	5	5	
300		4	4	****	****	****	****			
400		3	3	3	3	****	****	****	****	
500						5	5			
600						3	3			
700								3	3	
800										5
900										3
TOTAL	**5**	**7**	**7**	**8**	**8**	**8**	**8**	**8**	**8**	**8**

Questions:	Module Solutions
2. Once a resource histogram has been completed, the Project Manager can identify the resource overloads and underloads. Identify and explain five different ways in which these overloads can be addressed.	• Resource smoothing; (p.226) • Time limited resource scheduling; (p.228) • Resource limited resource scheduling; (p.229) • Increase resources; (p.230) • Decrease resources. (p.231)
3. Resource smoothing is the process of moving activities to improve the resource loading profile. The first step is to select the resource to be smoothed as you cannot smooth more than one resource at a time. What factors should you consider to decide which resource to smooth?	• The resource that is most overloaded; • The resource that is most used on the project; • The least flexible resource; • The most expensive resource.
4. Identify seven ways in which the project manager can increase resources.	• Working overtime; • Working shifts; • Increasing productivity; • Job and knock; • Learning curve; • Sub-contractors; • Reducing scope of work.
5. When resources are underloaded there are a number of options for reducing the available resources. Identify six of these options.	• Move unemployed resources to critical activities; • Move unemployed resources to R&D activities or fill in jobs; • Hire out the resources either internally or externally; • Pre-manufacture components before they are needed; • Use resources to maintain equipment; • Use the slack period as a training opportunity.

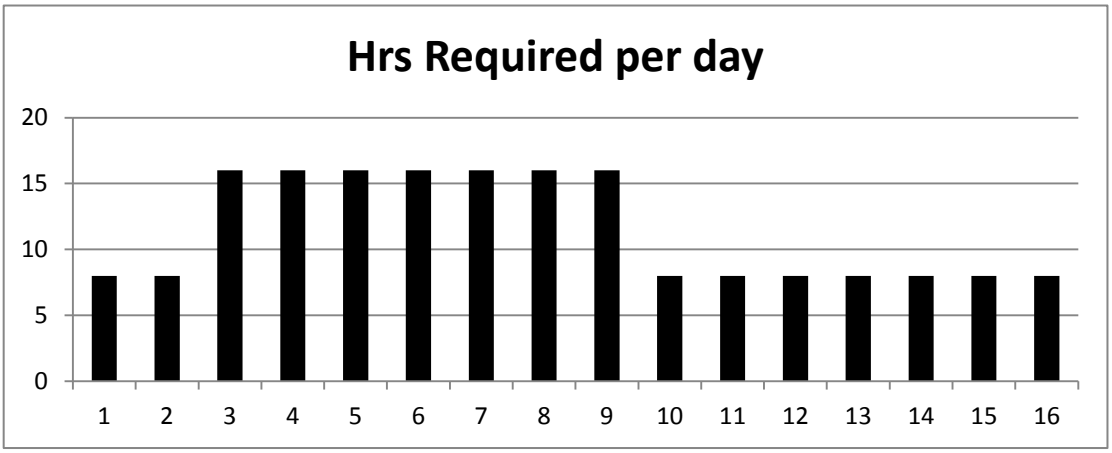
Revision Exercise 2

<table>
<tr><th>Questions:</th><th>Module Solutions</th></tr>
<tr><td>1. Describe resource smoothing – its objectives and the basic five step technique to perform it.</td><td>Resource smoothing is the process that addresses the challenges of project constraints. Resource smoothing is designed to minimise the effects of resource demands across the projects lifecycle. It has two objectives: a) to determine the resource requirements so that they will be available at the right time and b) to allow each activity to be scheduled with the smoothest possible profile across usage levels. The five steps are as follows:
1.1 Create a project activity network.
1.2 From the network create a resource table rewired for each activity, the activity durations and total float available.
1.3 Develop a time phased resource loading table.
1.4 Identify any resource conflicts and begin to smooth the activities.
1.5 Repeat step 4 as often as necessary.</td></tr>
<tr><td colspan="2">2. Use the activity precedence table below to create a resource histogram. Activity lengths are given in days and an 8 hour day is assumed.

<table>
<tr><th>Activity</th><th>Time</th><th>Predecessor</th></tr>
<tr><td>A</td><td>2</td><td>-</td></tr>
<tr><td>B</td><td>3</td><td>A</td></tr>
<tr><td>C</td><td>6</td><td>B</td></tr>
<tr><td>D</td><td>5</td><td>A</td></tr>
<tr><td>E</td><td>3</td><td>C</td></tr>
<tr><td>F</td><td>2</td><td>D</td></tr>
<tr><td>G</td><td>2</td><td>E,F</td></tr>
</table>
</td></tr>
</table>

Solution:

TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	8	8														
B			8	8	8											
C						8	8	8	8	8	8					
D			8	8	8	8	8									
E												8	8	8		
F								8	8							
G															8	8
TOTAL	8	8	16	16	16	16	16	16	16	8	8	8	8	8	8	8

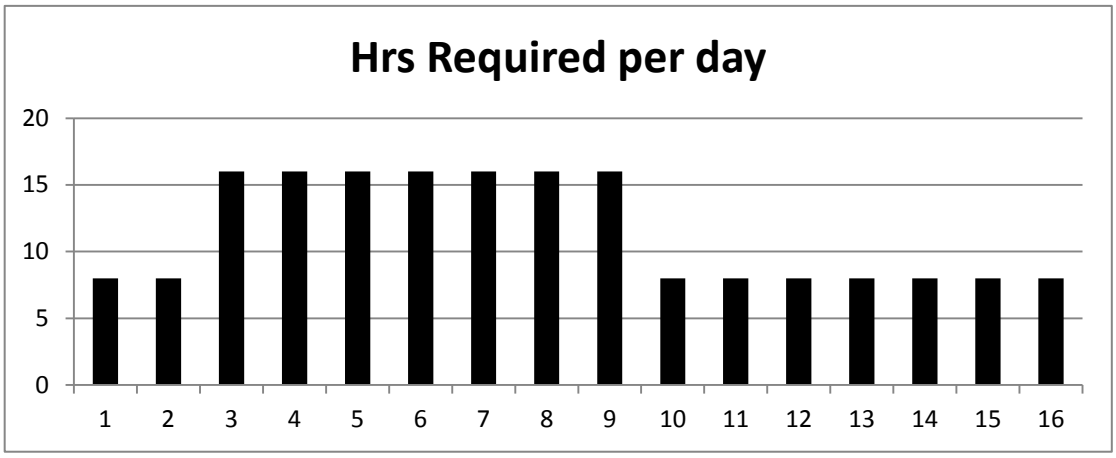


3. Use the activity precedence table below to create a resource histogram. Activity lengths are given in days and an 8 hour day is assumed.

Activity	Time	Predecessor
A	2	-
B	3	A
C	6	B
D	5	A
E	3	C
F	2	D
G	2	E,F

Solution:

TASK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	8	8														
B			8	8	8											
C						8	8	8	8	8	8					
D			8	8	8	8	8									
E												8	8	8		
F								8	8							
G															8	8
TOTAL	8	8	16	16	16	16	16	16	16	8	8	8	8	8	8	8



<table>
<tr><th>Questions:</th><th>Module Solutions</th></tr>
<tr><td>4. Use the table to determine the total resources required for this project if a worker is expected to devote 4 hours per day to this project:

<table>
<tr><th>Activity</th><th>Duration (days)</th><th>Predecessor</th></tr>
<tr><td>A</td><td>5</td><td>-</td></tr>
<tr><td>B</td><td>4</td><td>A</td></tr>
<tr><td>C</td><td>5</td><td>A</td></tr>
<tr><td>D</td><td>6</td><td>B</td></tr>
<tr><td>E</td><td>6</td><td>C,D</td></tr>
<tr><td>F</td><td>6</td><td>E</td></tr>
</table>
</td><td>128 hours.</td></tr>
<tr><td>5. Use the project described in the table below to determine the total resources required for activity D if a worker is expected to devote 4 hours per day to this project:

<table>
<tr><th>Activity</th><th>Duration (days)</th><th>Predecessor</th></tr>
<tr><td>A</td><td>5</td><td>-</td></tr>
<tr><td>B</td><td>4</td><td>A</td></tr>
<tr><td>C</td><td>5</td><td>A</td></tr>
<tr><td>D</td><td>6</td><td>B</td></tr>
<tr><td>E</td><td>6</td><td>C,D</td></tr>
<tr><td>F</td><td>6</td><td>E</td></tr>
</table>
</td><td>24 hours.</td></tr>
<tr><td>6. Use the information in the table below to determine the total resources required for activity G if a worker is expected to devote 4 hours per day, five days per week to this project:

<table>
<tr><th>Activity</th><th>Predecessor</th><th>Hrs/ day</th><th>Days</th></tr>
<tr><td>A</td><td>-</td><td>4</td><td>6</td></tr>
<tr><td>B</td><td>A</td><td>4</td><td>11</td></tr>
<tr><td>C</td><td>A</td><td>5</td><td>5</td></tr>
<tr><td>D</td><td>B</td><td>4</td><td>6</td></tr>
<tr><td>E</td><td>B</td><td>4</td><td>6</td></tr>
<tr><td>F</td><td>B</td><td>6</td><td>3</td></tr>
<tr><td>G</td><td>C,D</td><td>8</td><td>11</td></tr>
<tr><td>H</td><td>E,F</td><td>8</td><td>8</td></tr>
<tr><td>J</td><td>G,H</td><td>3</td><td>10</td></tr>
<tr><td>K</td><td>J</td><td>6</td><td>4</td></tr>
</table>
</td><td>88 hours.</td></tr>
</table>

Learning Unit 17: Project Cost Management	
Material used for this Learning Unit: • Prescribed text pp.232–245.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.232–245 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ How does PMBOK define project cost management?
  ○ What is a project cash management plan?
  ○ What is top-down and bottom-up estimating?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Conduct some Internet into challenges facing project managers with regards to managing the costs associated with projects. Then in groups of four to five, discuss the challenges identified. Compare these to challenges associated with project costs that you may have experienced in projects in which you have been involved.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Answer the following questions by reading the case study below.

1. Explain the challenge of delivering accurate cost estimation when working in harsh geographical conditions.

2. The original bidding process favoured the lowest project construction bids using a "fixed price" contract. What are the advantages and disadvantages to the Indian government when using this type of bidding process?

3. How did it contribute to gross underbids and successive cost escalations?

Begun in 1985, the Dulhasti Power project, set in the northern Indian provinces of Jammu and Kashmir, represents an example of a disaster in project cost estimation and delivery. As initially conceived, the project's cost was estimated at 1.6 billion rupees (about $50 million). By the time the contract was let, the cost estimates had risen to 4.5 billion rupees and later successively to 8, 11, 16, and 24 billion rupees (nearly $750 million). As of 2004, the project has still not been completed, although well over $1 billion has been spent pursuing it.

The project was based on a straightforward concept: Dilhasti was designed as a 390MW hydroelectric power plant to be built on the swift-flowing Chenab River in the Doda region, a rugged, mountainous section of the Himalayas, and several hundred kilometres form larger cities. The project sought to build a dam, erect a hydroelectric generating station, and string hundreds of miles of transmission lines starting near the headwaters of a system of rivers flowing onto the plain south of the mountain region. When the contract was awarded at a price of $50 million, the contracting organisations anticipated that the project could be completed in a reasonable time frame.

The contract for the power generation project was first awarded to a French consortium, who almost immediately asked for an upward price revision. The Indian government refused, suspecting that the French consortium had known all along that their initial bid was too low and were hoping to simply "buy" the project prior to renegotiating. The government's refusal to revise their price resulted in a second bidding process. Because of wider competition from other European countries now in the field, the second, accepted French offer was then even lower than their earlier one. Although this process initially appeared to save the Indian government money, it was not a good beginning to the partnership between the government and the French consortium.

Situated in the mountainous region of the Jammu and Kashmir provinces, the site was intended to capitalise on the proximity to large river systems capable of providing the water capacity needed to run a hydroelectric plant of Dulhasti's dimensions. Unfortunately, the site selected for the project came with some serious drawbacks as well; Pakistan and India. Jammu and Kashmir had been the epicentre of numerous and serious clashes between separatist forces supported by the Pakistan government and Indian army units stationed in the region to keep the peace. Constructing such an obvious target as a power plant in the disputed area was sure to provoke reaction by nationalist groups, using terrorism as their chief means of opposition. Thus, the additional costs of providing security to the site quickly become prohibitively expensive. A second problem concerns the sheer geographical challenge of creating a large plant in a region almost totally devoid of supporting infrastructure, including an adequate logistics network (roads and rail lines). Building the plant in the foothills of the Himalayas may be scenic, but it is not cost effective, particularly as almost all supplies had to be brought in with air transportation, at exorbitant costs. All raw materials, including cement, wood, stone, and steel, had to be hauled by helicopter for miles over snowbound areas.

The work on the plant continued in fits and starts for over 15 years. By the turn of the century, over $1 billion had been spent on the Dulhasti project and the plant is still not operational. Further, in order to offset the expense of the project, the cost of power to be generated by the plant has risen by over 500%, making the plant an inefficient producer of electrical power for the countryside.

The original French-led consortium that contracted to develop the plant has pulled out, forcing the Indian government to rebid it and award the contract to a Norwegian firm.

What is the status of the project to date? Still unfinished, the budget continues to be revised upward in hopes that the project will come on line by late 2005. A recent government report, including an evaluation of the project's current status, suggests that key elements of the project are less than 50% complete and will require yet another upward revision of the budget for Dulhasti, perhaps to as much as $1.6 billion. The project's end is still not in sight, form either a completed power plant or budgetary perspective.

3.2 Izimvo Exchange 2

Draw a mind-map showing the types of costs associated with a project. This will assist you in differentiating between the different types of costs.

3.3 Activity 1

Purpose:
To develop an understanding of how the accuracy of the estimate changes as projects progress along the project lifecycle.

Task:
Consider a project with which you are familiar. Referring to the estimating continuum, outline how the accuracy of the estimate changes as the project progresses along the project lifecycle.

Commentary Related to Activity Design:
N/A

3.4 Activity 2

Purpose:
To develop an applied understanding of top-down estimating and the cost of procuring materials and equipment.

Task:
Consider a project with which you are familiar. This can be the same project considered in Activity 1 above. Outline how top-down estimating can quickly provide a rough estimate. Then, using the same project, outline how the management cost of procuring materials and equipment is calculated.

Commentary Related to Activity Design:
N/A

3.5 Revision Exercise

1. Differentiate between top-down estimating and bottom-up estimating.

2. Explain through the use of an example, how one would calculate the labour rate for a particular project.

3. Differentiate between a cost estimate and a budget.

Solutions to Exercises

Revision Exercise

Questions:	Model Solutions:
1. Differentiate between top-down estimating and bottom-up estimating.	Prescribed textbook p.235.
2. Explain through the use of an example, how one would calculate the labour rate for a particular project.	Prescribed textbook pp.238–239.
3. Differentiate between a cost estimate and a budget.	Prescribed textbook p.242.

Learning Unit 18: Project Control	
Material used for this Learning Unit: • Prescribed text pp.262–275.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.262–275 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ What is the need for accurate data capturing?
  ○ How is problem solving relevant to project control?
  ○ When does problem solving start and decision making end?
  ○ In what ways can project managers apply project control?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

Watch the YouTube clip provided below on how to monitor and control projects. Summarise the contents of the video through the use of a mind map. You may need to watch the video a number of times in order to ensure that you have summarised all of the information covered.

How to Monitor and Control Projects. 2012. [Video online]. Available at: http://www.youtube.com/watch?v=AQnu_zxCETI [Accessed 17 May 2014].

3 Interactive Work Space

3.1 Izimvo Exchange 1

Assume that you are part of a project team that is developing an app for a new smart phone about to come to market. In groups of four discuss how you would address the following:

1. Limit over-optimistic reporting.

2. The data you need to capture in order to carefully control your project.

3. How you will capture the essential data for your project.

4. Design a data capture pro-forma which subdivides the work by percentage.

3.2 Izimvo Exchange 2

Class debate:
Split into two groups; each taking one side of the debate as detailed below. The lecturer will allow you time to prepare your arguments and will then mediate the debate:

For:
Project control is essential for the successful completion of a project.

Against:
Project control is not essential for the successful completion of a project.

3.3 Activity 1

Purpose:
To develop a broader understanding of problem solving within the project management filed.

Task:
Individually, read pp.270–271 in detail. Then, in groups of three to four, discuss your individual experiences of problems experienced on projects of which you have been a part. Discuss how the problem solving that you undertook on the project was a divergent process, while the decision making process was a convergent process.

Commentary Related to Activity Design:
N/A

3.4 Revision Exercise

1. List and explain any five of the steps in the project control cycle.

2. You are asked to provide some advice and support to a young graduate who has recently joined your organisation as a Project Manager. He/ she is specifically interested in ways of applying control to a project. What advice would you give to the graduate?

Solutions to Exercises

Revision Exercise

Questions:	Model Solutions:
1. List and explain any five of the steps in the project control cycle.	Prescribed textbook pp.264–265.
2. You are asked to provide some advice and support to a young graduate who has recently joined your organisation as a Project Manager. He/ she is specifically interested in ways of applying control to a project. What advice would you give to the graduate?	Prescribed textbook pp.274–275.

Learning Unit 19: Project Quality Management	
Material used for this Learning Unit: • Prescribed text pp.294–305.	*My Notes on this Learning Unit:*

How to prepare for this Learning Unit:
• Before the first class, be sure that you read pp.294–305 in the textbook.
• As you read these sections, see if you can find the answers to the following questions:
  ○ How does PMBOK define project quality management?
  ○ What is the difference between quality control and quality assurance?
  ○ What does ISO9000 mean?
  ○ What does continuous improvement mean?	

1 Recommended Additional Reading

Burke, R and Barron, S. 2007. *Project Management Leadership.* Cape Town. Burke Publishing.

Newell, MW and Grashina, MN. 2004. *Project management questions and answers book.* New York, (NY): Amacom.

Steyn, H. 2007. *Project management: a multi-disciplinary approach.* Pretoria: Funda Project Management.

2 Recommended Digital Engagement and Activities

View the following video about the difference between QA and QC:

Project Quality Management. 2012. [Video online]. Available at: http://www.youtube.com/watch?v=mVsxxoGHHWM [Accessed 17 May 2014].

Search the internet for information relating to TQM, ISO and other quality management techniques. Extend your knowledge of the systems available and consider which process is best for a project environment.

3 Interactive Work Space

3.1 Izimvo Exchange 1

Work in groups of four. Each member takes one of the subjects given below. Research it and prepare a 15 minute lesson to explain the subject to the other members of your group. It would be appropriate to develop a small test for the end of the lesson to assess how well your students understand the subject.

1. Total Quality Management.

2. ISO 9000.

3. Quality Circles.

4. Six Sigma (Google the answer as it cannot be found in the prescribed textbook).

3.2 Izimvo Exchange 2

In the same group of four as above, discuss and prepare answers to the following:

1. What is a project quality plan?

2. Why must quality be a continuous process from the beginning of a project until the end?

3. What quality costs would you expect to incur if you were managing a project that was developing a new baby food product specifically for the South African market? Divide the costs into the different types of quality cost:
   - Prevention costs;
   - Appraisal costs;
   - Failure costs (internal);
   - Failure costs (external).

3.3 Activity 1

Purpose:
To ensure that students understand the principles of quality management within the structure of a project.

Task:
You have been appointed project manager for a large road improvement project in the Western Cape. Develop an outline quality management plan that incorporates the following:

- How to establish the required quality for your project;
- How you will monitor and test the quality of the work on your project;
- How you will organise corrective action when you find items that do not conform to your project plan.

Commentary Related to Activity Design:
N/A

3.4 Activity 2

Purpose:
To identify and recognise the different elements that make up a quality plan.

Task:
1. Find and write down the PMBOK® definitions for the following:

    1.1 Project Quality Management Process.

    1.2 Quality.

    1.3 Quality Planning.

2. Find and write down the APM BoK definitions for the following:

    2.1 Project Quality Management.

    2.2 Audit.

    2.3 Quality Assurance (QA).

    2.4 Quality Control (QC).

3.5 Revision Exercise 1

1. What is a project quality plan? What steps are involved?

2. List and explain four different quality costs. Give an example of each type of cost.

3. Explain the difference between quality control and quality assurance. Give examples to illustrate your answer.

4. Identify what might happen if your project is operating at a poor standard of quality.

3.6 Revision Exercise 2

1. Write T if the statement is true and F if the statement is false:

    1.1 Six sigma is a quality management process that helps in setting standards for quality and in the monitoring process.

    1.2 Fitness for use means the product must be usable as it was originally intended.

    1.3 Total quality describes the culture, attitude and organisation of a company that strives to provide customers (internal and external) with products and services that satisfy their needs.

    1.4 Quality planning and work performance information are outputs of the quality assurance process.

    1.5 Quality assurance is accomplished by quality audits, process analysis and tools and techniques used in quality control.

    1.6 If a non-conformance report has been raised it means that the parameter is within specification.

Solutions to Exercises

Revision Exercise 1

Questions:	Model Solutions:
1. What is a project quality plan? What steps are involved?	A project quality plan is a set of activities planned at the beginning of a project that helps achieve quality during the project. The steps include: • Gathering input data; • Analysing data; • Setting quality metrics; • Developing an improvement plan.
2. List and explain four different quality costs. Give an example of each type of cost.	• **Prevention costs:** Expenses associated with steps taken to ensure product made in correct condition; • **Appraisal costs:** Costs incurred whilst checking and inspecting work to see that it conforms to specification; • **Internal failure costs:** Costs incurred inside company due to product failure and inefficiencies; • **External failure costs**: Costs incurred outside the company usually motivate by client.
3. Explain the difference between quality control and quality assurance. Give examples to illustrate your answer.	See quality definitions on pp.296–298 of textbook.

Revision Exercise 2

Questions:	Model Solutions:
Write T if the statement is true and F if the statement is false: 1. Six sigma is a quality management process that helps in setting standards for quality and in the monitoring process.	T
2. Fitness for use means the product must be usable as it was originally intended.	T
3. Total quality describes the culture, attitude and organisation of a company that strives to provide customers (internal and external) with products and services that satisfy their needs.	T
4. Quality planning and work performance information are outputs of the quality assurance process.	F
5. Quality assurance is accomplished by quality audits, process analysis and tools and techniques used in quality control.	T
6. If a non-conformance report has been raised it means that the parameter is within specification.	F

Bibliography

Brewster, M. 2007. *Celebrating the anniversary of the press release.* [Online]. Available at: http://www.bizcommunity.com/Article/196/18/19252.html [Accessed 7 November 2007].

Burke, R. 2013. *Project management techniques: college edition.* 2nd edition. Ringwood: Burke Publishing. ISBN: 9780987668301.

Cutlip, SM, Center, AH and Broom, GM. 2006. *Effective public relations*. Upper Saddle River, (NJ): Pearson Education.

De Beer, AS. ed. 1998. *Mass media.* Pretoria: Van Schaik.

ICASA. 2007. *About ICASA – Overview.* [Online]. Available at: http://www.icasa.org.za [Accessed 22 January 2007].

Kaplan, AM and Haenlein, M. 2010. *Users of the world, unite! The challenges and opportunities of social media.* [Online]. Available at: http://www.sciencedirect.com/science/article/B6W45-4XFF2S01/2/600db1bd6e0c9903c744aaf34b0b12e1 [Accessed 30 September 2010].

Mawazada, M and Crush, J. 2010. Metaphors of migration: Zimbabwean migrants in the South African media. In: J. Crush and D. Tevera. eds. *Zimbabwe's exodus: Crisis, migration, survival.* Cape Town: South African Migration Programme, pp.363–374.

Nathan, L. 2010. Intelligence bound: The South African constitution and intelligence services. *International Affairs*, 86(1), pp.106–113.

Plagiarism

Plagiarism is any use of the words, ideas or images of another person without acknowledging the source using the required conventions. Below is a description of plagiarism and referencing. Please make sure that you are familiar with this information before attempting your assignment.

Introduction to Referencing and Plagiarism

What is 'Plagiarism'?

'Plagiarism' is the act of taking someone's words or ideas and presenting them as your own.

What is 'Referencing'?

'Referencing' is the act of referring to or consulting. A 'reference' is a publication or passage from a publication that is referred to.

Referencing is the acknowledgment of any work that is not your own, but is used by you in an academic document. It is simply a way of giving credit to and acknowledging the ideas and words of others.

When writing assignments, students are required to acknowledge the work, words or ideas of others, through the technique of referencing. Referencing occurs in the text at the place where the work of others is being cited, and at the end of the document, in the bibliography.

Cumming (2007) describes the bibliography as a list of all the work (published and unpublished) that a writer has read in the course of preparing a piece of writing. This includes items that are not directly cited in the work.

A reference is required when you:

- Quote directly: when you use the exact words as they appear in the source;
- Copy directly: when you copy data, figures, tables, images, music, videos or frameworks;
- Summarise: when you write a short account of what is in the source;
- Paraphrase: when you state the work, words and ideas of someone else in your own words.

It is standard practice in the academic world to recognise and respect the ownership of ideas through good referencing techniques. However, there are other reasons why referencing is useful.

Good Reasons for Referencing

It is good academic practice to reference because:

- It enhances the quality of your writing;
- It demonstrates the scope, depth and breadth of your research;
- It gives structure and strength to the aims of your article or paper;
- It endorses your arguments;
- It allows readers to access source documents relating to your work, quickly and easily (Neville, 2007, p.7).

Sources

The following would count as 'sources':

- Books,
- Chapters from books,
- Encyclopaedia,
- Articles,
- Journals,
- Magazines,
- Periodicals,
- Newspaper articles,
- Items from the Internet (images, videos, etc.),
- Pictures,
- Unpublished notes, articles, papers, books, manuscripts, dissertations, theses, etc.,
- Diagrams,
- Videos,
- Films,
- Music,
- Works of fiction (novels, short stories or poetry).

What You Need to Document from the Hard Copy Source You are Using

(Not every detail will be applicable in every case. However, the following lists provide a guide to what information is needed.)

You need to acknowledge:

- The words or work of the author(s),
- The author(s)'s or editor(s)'s full names,
- If your source is a group/ organisation/ body, you need all the details,
- Name of the journal, periodical, magazine, book, etc.,
- Edition,
- Publisher's name,
- Place of publication (i.e. the city of publication),
- Year of publication,
- Volume number,
- Issue number,
- Page numbers.

What You Need to Document if you are Citing Electronic Sources

- Author(s)'s/ editor(s)'s name,
- Title of the page,
- Title of the site,
- Copyright date, or the date that the page was last updated,
- Full Internet address of page(s),
- Date you accessed/ viewed the source,
- Any other relevant information pertaining to the web page or website.

Referencing Systems

There are a number of referencing systems in use and each has its own consistent rules. While these may differ from system-to-system, the referencing system followed needs to be used consistently, throughout the text. Different referencing systems cannot be mixed in the same piece of work!

A detailed guide to referencing, entitled Referencing and Plagiarism Guide is available from your library. Please refer to it if you require further assistance.

When is Referencing Not Necessary?

This is a difficult question to answer – usually when something is 'common knowledge'. However, it is not always clear what 'common knowledge' is.

Examples of 'common knowledge' are:

- Nelson Mandela was released from prison in 1990;
- The world's largest diamond was found in South Africa;
- South Africa is divided into nine (9) provinces;
- The lion is also known as 'The King of the Jungle'.
- $E = mc^2$
- Jan Van Riebeeck was the first person to settle in the Southern Cape.

Usually, all of the above examples would not be referenced. The equation $E = mc^2$ is Einstein's famous equation for calculations of total energy and has become so familiar that it is not referenced to Einstein.

Sometimes what we think is 'common knowledge', is not. E.g. the above statement about Van Riebeeck is only partly true – he was the first European to settle in the Cape. It was, however, not an 'uninhabited' area when he got there. The Khoisan, the original inhabitants of the Cape, had been living in the area for some time. It is not entirely accurate then to claim that Van Riebeeck was the first inhabitant. (Crampton, 2004, p.57)

It is thus generally safer to always check your facts and try to find a reputable source for your claim.

Important Plagiarism Reminders

The IIE respects the intellectual property of other people and requires its students to be familiar with the necessary referencing conventions. Please ensure that you seek assistance in this regard before submitting work if you are uncertain.

If you fail to acknowledge the work or ideas of others or do so inadequately this will be handled in terms of the Plagiarism Policy (available in the library) and/ or the Student Code of Conduct – dependent on whether or not plagiarism and/ or cheating (passing off the work of other people as your own by copying the work of other students or copying off the Internet or from another source) is suspected.

This campus offers individual and group training on referencing conventions – please speak to your librarian or ADC/ Campus Co-Navigator in this regard.

<u>Reiteration of the Declaration you have signed:</u>

1. I have been informed about the seriousness of acts of plagiarism.
2. I understand what plagiarism is.
3. I am aware that The Independent Institute of Education (IIE) has a policy regarding plagiarism and that it does not accept acts of plagiarism.
4. I am aware that the Plagiarism Policy and the Student Code of Conduct prescribe the consequences of plagiarism.
5. I am aware that referencing guides are available in my student handbook or equivalent and in the library and that following them is a requirement for successful completion of my programme.
6. I am aware that should I require support or assistance in using referencing guides to avoid plagiarism I may speak to the lecturers, the librarian or the campus ADC/ Campus Co-Navigator.
7. I am aware of the consequences of plagiarism.

Please ask for assistance prior to submitting work if you are at all unsure.